ARCHIVES OF OPHTHALMOLOGY.

THE EQUIVALENT REFRACTIVE INDEX OF THE LENS IN ACCOMMODATION.

By Dr. W. N. SUTER, Washington, D. C.

IT has generally been assumed that the equivalent index of the crystalline lens is the same in accommodation as in relaxation; that this is not the case has been stated by Heine,[1] though his reason for asserting that the index is higher in accommodation seems to me to be invalid.

Assuming the curvatures and positions of the surfaces to be correctly estimated by ophthalmometry, an increase of index must be assumed in order to account for the accommodative power of the eye. It is true that measurements and calculations made many years ago by Knapp[2] for the determination of the near point resulted in close agreement with the position of the near point as experimentally determined. In these calculations the constants adopted by Listing were used, the index of the lens being regarded as 1.4545; but later investigations have shown this index to be too high. The schematic eye of Listing is, as is well known, too short; it corresponds in length, not to the emmetropic eye of nature, but to a hyperopia of several dioptres. Taking Dr. Knapp's measurements and calculating the focal distances of the eye in a state of rest and in accommodation, assigning 1.4371 as the index of the lens, the near point, as determined by calculation, will always be more remote than as determined experimentally.

Helmholtz has assigned, as average data in young adults, 6 *mm* for the radius of the anterior surface, 5.5 *mm* for the posterior surface, and 4 *mm* as the thickness of the lens in

[1] "Aenderungen in der Gestalt und dem Brechungsindex der menschlichen Linse nach Durchschneidung der Zonula," Bericht der ophth. Gesell. xxvii. (1898), Heidelberg.

[2] *Archiv für Ophth.*, vi., pp. 21–52, 1860.

maximum accommodation. Assuming the retina to lie 22.8 *mm* behind the summit of the cornea, as in Helmholtz's later schematic eye, and assigning 1.4371 as the index of the lens, the anterior conjugate to the retina will be found to lie 152.6 *mm* from the eye.[1] This represents an amplitude of 6.5 D. of accommodation, which is less than that of the normal eye in persons under 30 years of age.

Since the near point as determined by calculation, is uniformly more remote than as determined experimentally, it follows that the increase of external curvature alone is not sufficient to account for the total accommodative power; *an increase of equivalent index must be assumed.*

Heine's experiments upon the lenses of dead persons were conducted for the purpose of demonstrating an increase of apex curvature of the anterior surface on relaxation of the suspensory ligament. This increase of curvature was found to occur by the accumulation at the anterior pole of an albuminoid substance whose refractive index was lower than that of the substance found at the anterior pole in a state of tension.

While these experiments are of value as indicating that a diminishing curvature of the anterior lens-surface is not inconsistent with Helmholtz's theory (which assumes only the general tendency of the lens to approximate the spherical form: the exact curvature may be modified by the structure of the capsule and by other factors), yet they do not prove an increase of equivalent index. It is not probable that the change described by Heine is similar to that which takes place in accommodation; for, in the first place, it is doubtful if there exists at the anterior pole of the lens in life sufficient free albuminoid matter to accomplish the change in curvature. It is well known that the external layers of lens-substance soften rapidly after death, but that in the perfectly fresh lens there is very little substance such as might be freely movable between the capsule and the fibres. In the second place, if this should be the change which takes place in life, it would preclude the assumption of any increase of *nuclear* curvature.

[1] Helmholtz, *Phys. Optik*, 2 Auf., p. 140.

The reason that the equivalent index is higher than the nuclear index is to be found in the fact that the nuclear curvature is much greater than that of the whole lens; the external layers act as divergent menisci, and to a greater extent according as the cortical index is higher. Consequently, *the curvatures remaining unchanged*, the total index is higher according as the cortical index is lower. But the change described by Heine involves a relative change in the curvatures of the cortex and nucleus. With an increase of cortical curvature, without a corresponding increase of nuclear curvature, the diverging power of the cortex is diminished. The refractive power of the lens is therefore increased by the increase of curvature; *but the equivalent index is diminished*, for this exceeds the nuclear index by reason of the excess of nuclear curvature, and when this excess diminishes the equivalent index diminishes. If the cortical curvature were sufficiently increased, the cortex would produce no divergence, and the equivalent index would be equal to the index of the nucleus.

From this it is apparent that an increase of curvature produced by an accumulation of soft material at the anterior pole would tend to diminish the equivalent or *total* index, and the fact that this material has a lower index than that of the material found here in a state of tension of the suspensory ligament does not prove an increase of index.

In order to account for accommodative power we must assume not only an increase of cortical curvature, *but of nuclear curvature also* and in order that the total index may be greater than it is during relaxation of the accommodation the *increase of nuclear curvature must be in excess of the increase of cortical curvature.*

While accommodation is dependent upon the fluidity of the lens, yet in this body each fibre is distinct, and there can be no free flow of substance as in a perfectly fluid body. Hence, when in accommodation the anterior capsule bulges forward and assumes greater convexity, the axial portions of the fibres also bulge forward with a corresponding central tendency of their peripheral portions. The forward movement of the cortical fibres will be greater than that of the

nuclear fibres, but a very slight movement of the latter will cause a greater change of curvature than the greater movement of the former. This is illustrated in the accompanying figure.

When, with increase of age, the nucleus becomes solidified, the alteration in curvature must be effected by rearrangement of the soft substance of the more external fibres, with little or no increase of nuclear curvature. This would tend still further to diminish accommodative power by diminution of index—a tendency which, perhaps, is neutralized by the increase which takes place in the nuclear index with the increase in its solidity.

EXENTERATION OF THE ORBIT FOR MALIGNANT DISEASE WITH IMMEDIATE APPLICATION OF THIERSCH SKIN-FLAPS THROUGHOUT THE ENTIRE ORBITAL WOUND.

By HARRY FRIEDENWALD, A.B., M.D., Baltimore, Md.

John K., aged seventy-two years, farmer, was admitted to the Baltimore City Hospital on October 2, 1900. He had a good family history and had enjoyed good health until four years previously, when the lower lid of the left eye became diseased. About six months later it was in part removed, and two years afterwards cauterized. The affection, however, gradually involved the entire lower lid and the conjunctiva of the eyeball. The sight of this eye has been lost for about eighteen months.

Stat. Præs.—The lower lid, the inner and outer portions of the upper lid, are destroyed; the conjunctiva bulbi is lost and the eyeball exposed on both sides and below. The eyeball is of normal size, but the cornea is replaced by a dense white tissue. The ulceration and infiltration extend somewhat over the malar region. The ulcerated surface secretes an abundant amount of pus. The parts were frequently cleansed with boric acid and later with bichloride solutions.

On October 7th, the eye and the neighboring region, as well as the left thigh, were thoroughly cleansed and as far as possible sterilized, and bichloride-of-mercury dressing applied as a preparation for the

Operation, October 8th: Under ether anæsthesia, incisions were made through the upper portion of the upper eyelid and the base of the lower lid, following the line of the margin of the orbit which met on the side of the nose and beyond the affected region over the malar bone. The incision was at all points sufficiently distant from the diseased tissue and was carried down through the

periosteum to the bone. The periosteum was next separated with a small raspatory from the underlying bone as far into the orbit as it was possible to reach. The entire mass was then severed near the apex of the orbit with scissors.[1] The hemorrhage having been easily controlled by pressure, the cavity was thoroughly cleansed of remaining portions of tissue (especially near the apex).

In order to diminish the size of the very large wound, the skin over the temple and malar bone was loosened from the underlying tissues. It yielded sufficiently to be brought together by sutures to the extent of about one inch.

Long Thiersch flaps were next obtained from the thigh (which had been prepared for the purpose) and cut into pieces sufficiently long that when applied to the orbit they reached from the apex to the margin. They were carefully spread out upon the bone surface and firmly applied, and no part of the wound was left uncovered. Small pledgets of gauze soaked in sterilized saline solution were next carefully applied throughout the entire cavity and the centre filled with dry gauze under slight pressure so as to prevent hemorrhage. A sterile dressing was next placed over the entire orbit and the wound of the thigh bandaged.

The patient recovered without any untoward symptoms and his temperature remained normal.

First dressing : This was made one week after the operation, on October 15th. The dressings were thoroughly soaked with bichloride and removed with great care so as to avoid injuring the grafts. The wound was found clean and the grafts adhering to the bone. Small strips of sterile gutta-percha were laid over the grafts and a sterile dressing applied.

October 22d. — The second dressing was made. The skin grafts appear to be taking everywhere; the scarf skin is in part loose. Sutures removed and dressing similar to the last applied.

October 27th.—Wound dressed again. Scarcely any secretion. The skin grafts have taken everywhere. Near the outer part of the orbit there is a small necrosed portion about 3 *mm* in diameter and on the inner side of the orbit another smaller area.

November 2d.—Orbit dressed again. Sensation of left side of the forehead lost. Condition otherwise unchanged.

November 5th.—Wound very good. At two points small granulations have appeared, to which the sulphate-of-copper crystal is applied.

[1] Microscopic sections prove the tumor to have been an epithelioma.

November 9th.—Granulations touched with nitrate of silver solution.

November 17th.—Orbit redressed; granulations are diminishing and have in part disappeared.

On November 20, 1900, the patient was presented at a meeting of the Medical and Chirurgical Faculty of Maryland held at Towson. The wound had healed completely. There was a small opening at about the centre of the os planum of the ethmoid, but otherwise the entire cavity, including the region of the lachrymal duct, was lined by firm and healthy epidermis. This was six weeks after the operation. The patient was discharged from the hospital a few days later and allowed to go to his home in West Virginia.

When I performed this operation I was not aware that it had been done before.

Busachi suggested the use of Thiersch grafts, but he applied them *after* the wound was covered with granulations.[1]

V. Noorden published "A Case of Thiersch Transplantation of the Entire Orbital Cavity" from the Clinic of Mikulicz in Breslau in 1892.[2] He applied the Thiersch grafts *directly* upon the surface of the bone as was done in my case, and reported an equally favorable result.

Little need be added in the way of remarks. The advantages of the application of Thiersch grafts after removal of the contents of the orbit are obvious. I need only allude to the great shortening of the period of recovery. Another advantage suggests itself in the fact that early recurrence of the tumor may be recognized easily in the orbit lined by epidermis.

[1] *Riforma med.*, 4, p. 467. Reviewed in *Nagel's Jahresbericht* for 1891, p. 419.

[2] *Berlin Klin. Wochenschr.*, 1892, p. 1017.

DIFFERENT METHODS IN WHICH GLIOMA OF THE RETINA INVADES AND AFFECTS THE OPTIC NERVE.

By E. F. SNYDACKER, B.A., M.D.

OCULIST TO WEST SIDE DISPENSARY OF UNITED HEBREW CHARITIES, CHICAGO.

(*With five figures on Text Plate I.*)

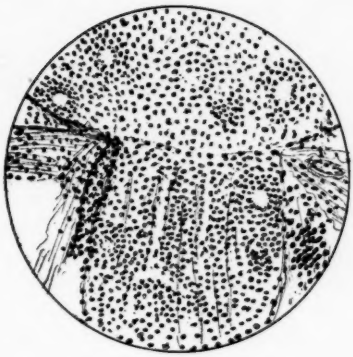
GLIOMA exhibits at times remarkable differences in its relations to the optic nerve; this is perhaps not so much due to differences in the tumors themselves as to the varying anatomical peculiarities of the nerve in different individuals. Here as elsewhere the tumor seems to propagate itself along the lines of least resistance, and in all probability this law will in most cases explain the diverse paths of the tumor cells.

In spite of the voluminous literature on glioma of the retina most authors have had but little to say on its method of attacking and invading the optic nerve, and as I have been able to gather from various sources sections illustrating the various paths followed by the tumor cells, a brief description of my sections may be of interest.

Section 1.—Nerve small and atrophic. Septa of nerve are increased in size and contain many young connective-tissue cells. Bundles of nerve fibres small and thin. Nerve head shows cylindrical excavation, which is filled out with tumor cells. In spite of this fact not a single tumor cell can be found which has made its way into the nerve itself. Walls of central artery are thickened and its endothelium has proliferated. No tumor cells in intervaginal space. Iris angle is obliterated.

Section 2.—Nerve is atrophic. Connective tissue septa are

SECTION 2



SECTION 7

SECTION 8

SECTION 9

SECTION 10

broad. Large mass of tumor cells fills a deep flask-shaped excavation of the lamina cribrosa. In several places tumor cells have made their way through the lamina cribrosa, and small tongues of tumor cells are beginning to invade the bundles of nerve fibres. The change of shape of the tumor cells after passing through the lamina cribrosa is here well exemplified. The cells are lengthened and attenuated, and the nuclei, too, are thin and distorted. The tumor cells are making their way along the perivascular spaces of the posterior ciliary vessels, between the fibres of the sclera, into the dural sheath of the nerve and the subdural space. The endothelium of the intervaginal space has proliferated greatly. (See text plate 1.)

Section 3.—Nerve head deeply excavated and filled with mass of tumor cells. Tumor cells have everywhere made their way through the lamina cribrosa and are diffusely invading the bundles of nerve fibres. Immediately behind the lamina cribrosa the nerve is small and thin, but it soon swells to broad, thick dimensions. The connective-tissue septa still mark off the spaces formerly occupied by the bundles of nerve fibres. Central vessels are surrounded by a dense mass of tumor cells which are here beginning to invade the connective-tissue septa. The vein is full of blood, all the coats of the artery are thickened, especially the adventitia ; the endothelium has proliferated so greatly as almost to occlude the lumen of the vessel. Tumor cells have invaded the sclera along the course of the posterior ciliary vessels. The dural sheath is infiltrated with glioma cells, as also are the arachmoid and pial sheaths. The intervaginal space is filled partly with glioma, partly with endothelial cells. Gradually the masses of tumor cells which are invading the nerve fibres become less dense, till only a few isolated cells can be found.

Section 4.—Deep flask-shaped excavation, with overhanging edges, filled with glioma cells. In spite of the fact that the tumor fills but a small portion of the ball, and has invaded but a comparatively small portion of the vitreous, glioma cells have completely invaded the nerve-fibre bundles ; the septa have also been invaded and are rapidly disappearing, and differentiation between what were formerly separate bundles of nerve fibres is rapidly becoming lost. The pial sheath has been invaded and the intervaginal space contains glioma cells intermingled with proliferated endothelial cells. The subdural space contains no glioma cells, and the dural sheath is also intact.

Section 5.—Tumor fills entire ball, cornea has become globular in shape, anterior chamber is full of tumor cells, parts of tumor have already become necrotic; in spite of these evidences that the tumor has existed for some time and must have exerted considerable pressure on the eye, the optic nerve shows but little sign of invasion. The lamina cribrosa is not excavated, and though the nerve is atrophic, but few tumor cells have filtered through the lamina. A few glioma cells are making their way along the posterior ciliary vessels into the retrobulbar space and into the dural sheath. The intervaginal space is filled with a few glioma cells and proliferated endothelial cells. The septa are broad and contain many young connective-tissue cells, but no tumor cells.

Section 6.—The nerve head is completely infiltrated with glioma cells. Lamina cribrosa cannot be found. Septa have almost entirely disappeared, so that it is impossible to determine where nerve bundles originally were. Sclera is infiltrated and split up into layers. Retrobulbar space densely packed with tumor cells, which have made their way backward after perforating anterior portion of bulbus. Differentiation between nerve sheaths lost. Central vessels show curious change; they are pulled into the bulbus as if by contracting bands of connective tissue, they are elongated, the lumen of the artery almost obliterated by endothelium, and both vein and artery thrombosed.

Section 7.—The whole nerve has become changed into a tumor mass, the periphery of which shows characteristic tubular arrangement of the glioma cells; the middle of the mass stains diffusely with eosin and shows but few nuclei. The lamina cribrosa is not distinguishable, nor is the intervaginal space or the nerve sheaths. The septa have almost entirely disappeared and a few faint longitudinal striations indicate the former differentiation into separate bundles of nerve fibres. (See text plate 1.)

Section 8.—Cross section of optic nerve. Surrounding dural sheath are dense masses of glioma cells showing characteristic tubular arrangement of the cells. In the intervaginal space completely encircling the small and compressed optic nerve is another layer of tumor cells. The nerve sheaths are infiltrated with tumor cells, and from the pial sheath small bodies of cells are beginning to run in along the septa toward the centre of the nerve. The nerve fibres have as yet not been invaded. (See text plate 1.)

Section 9.—Cross section of optic nerve. Sheaths, nerve fibres, and septa are completely infiltrated with tumor cells.

Central vessels surrounded by dense masses of cells. Walls of the artery are thickened and the lumen of the vessel is almost occluded by proliferated endothelium. (See text plate 1.)

Section 10.—Cross section of a nerve which has been invaded downward by a glioma, through the chiasm from the other nerve. The tumor cells from the intervaginal space and infiltrated pial sheath are invading the nerve chiefly along the connective-tissue septa, although the nerve fibres too show some infiltration by the tumor cells. The nerve is small and atrophic. (See text plate 1.)

If we examine these cases collectively a number of interesting questions present themselves.

Optic Atrophy.—In all of these cases where the nerve fibres were still recognizable, the optic nerve was atrophic, even though the nerve had not as yet been invaded by the glioma. The immediate cause of this atrophy it is impossible to determine, and must always be a matter of more or less conjecture. How much of this atrophy is due to secondary glaucoma, how much is secondary to destruction of the retina, and what part the direct pressure and influence of the tumor and its toxines plays it is impossible to say. Another undoubted factor, too, is the impaired blood supply of the nerve, since its nutrient vessels undergo early changes which must seriously impair its nutrition. These varying etiological features are undoubtedly of varying importance in different cases; probably in almost every case most of them are at work.

The atrophy plays an important role in the invasion of the optic nerve, for when the nerve fibres become small and shrunken, and no longer fill out the interspaces of the lamina cribrosa, the means of ingress is made easier for the tumor cells.

Secondary Glaucoma is present in a large proportion of the cases,—in exactly what proportion, it is impossible to say, as the microscopical findings which we should expect in glaucoma, viz., obliteration of the iris angle and excavation of the nerve head, are either veiled by or may be ascribed to the tumor itself. Whether in a given case the lamina cribrosa is crowded back by the glioma cells or whether the excavation is due to glaucoma cannot be determined, and so,

too, where the tumor has invaded the anterior portion of the ball the condition of the iris angle throws but little light on the subject; it may, however, be presumed that where the iris angle is early obliterated or invaded by the tumor, glaucomatous symptoms will be more marked than where this is not the case.

Glaucomatous symptoms are not necessarily dependent on the size or age of the tumor. In **Section 1** there is a deep excavation, the iris angle is obliterated, though the tumor is still comparatively small and has not yet invaded the nerve; in **Section 4** the tumor occupies but a small part of the ball and the papilla is deeply excavated; while in **Section 5**, though the tumor fills the whole ball and portions of it are already degenerating, the lamina cribrosa is not excavated.

Channels of Invasion.—In invading the optic nerve the tumor cells may follow a number of different paths; as a rule it will be found—and especially when the invasion of the nerve has become extensive—that the tumor cells are entering the nerve by a variety of ways at the same time, as in **Sections 2, 3, 4, 5, 6, 7, 9.**

I. The commonest method of invasion is for the tumor cells to force their way through the interspaces of the lamina cribrosa, into the nerve-fibre bundles, to follow these backwards, invading them and substituting glioma cells in their place.

II. The perivascular spaces of the central vessels also afford a means of ingress for the tumor cells. The tumor pushes its way in alongside the vessels, and then the cells radiate outwards in the stroma of the nerve exactly as the anatomy of the parts would lead us to expect, for the septa are connected with the vessel sheaths, radiating outward and forming the sustentacular framework of the nerve.

III. The cells, after infiltrating the nerve fibres through the lamina cribrosa, invade the pial sheath, fill the intervaginal sheath, run backward and reinvade the nerve, mainly along the septa.

IV. The cells invade the choroid, then follow the course of the posterior ciliary vessels and nerves. In this manner they may invade the dural sheath in one of two ways: they

may force their way between the fibre bundles of the sclera and thence into the dural sheath and intervaginal space, or they may make their way into the retrobulbar space and from here invade the dural sheath.

V. The glioma cells follow the course of the venæ vorticosæ and from here follow the lymph channels into the supravaginal space and infiltrate the nerve sheaths.

VI. Tumor perforates the ball and invades the nerve from the orbit.

Changes in the Vessels.—In none of these sections could a single instance be found where the tumor was invading the walls either of the central retinal or posterior ciliary vessels. The earlier changes in the vessels, such as thickening of the vessel coats and proliferation of endothelium, must be ascribed to blood stasis due either to direct pressure of the tumor or to glaucoma. Perhaps, too, absorption of toxines from the tumor into the blood may have contributed to the vessel changes.

The later thrombosis of the vessels is simply a later stage of the process, and due to the same causes. These changes in the vessels early influence the nutrition of the retina and nerve and form an important factor in the early atrophy.

Changes in the Intervaginal Space.—The proliferation of endothelium even before this space is invaded by tumor cells must be ascribed to lymph stasis resulting from pressure on lymph channels; perhaps it is also due to irritation by the toxines carried from the tumor into the lymph channels.

The frequency with which the cells invade the perivascular and intervaginal spaces shows that the lymph channels form an important method of propagating the tumor.

The Connective-Tissue Septa.—Before the nerve is invaded by the tumor cells the septa are large and broad, as in any case of optic atrophy; when the nerve begins to swell and enlarge, they become partly rarefied, partly replaced by tumor cells, till at times hardly a trace of them can be found. Doubtless the impaired blood supply as well as the invasion of the tumor cells enters into this process. The tumor cells seem to find great difficulty in passing

directly from the septa into the nerve fibres and vice versa: even though they have completely infiltrated the bundles of nerve fibres, the septa may not be attacked; on the other hand, when the glioma has invaded the septa from the intervaginal or perivascular spaces, the stroma may be infiltrated, while the nerve fibres are free from tumor cells. When the nerve, however, is diffusely invaded it will very commonly be found that tumor cells are invading the nerve fibres through the lamina cribrosa and are attacking the septa at the same time from the perivascular and intervaginal spaces.

Lamina Cribrosa.—The lamina at first bars the passage of the tumor cells; in some instances the glioma seems to find it but a slight obstacle, in others it seems to resist the passage of the tumor cells to the very last. This in all probability varies much with the condition of the optic nerve: where the nerve fibres have atrophed and the interspaces are not filled out, the cells soon find their way through. Undoubtedly, too, varying anatomical conditions of the parts in different individuals are of importance in this relation.

When the tumor has invaded the nerve, the fibres of the lamina become infiltrated with tumor cells, and the blood supply is impaired till not a vestage of its structure can be found.

Literature.—Most authors agree that the commonest method of invasions of the optic nerve is along the nerve fibres, after the tumor cells have forced their way through the lamina cribrosa. Knapp (1), however, thinks the commonest path is along the perivascular spaces of the central vessels and the connective tissue of the nerve. Da Gama Pinto (2) holds that the connective tissue of the nerve is first attacked. Wintersteiner (3), on the other hand, considers the common method to be through the interspaces of the lamina along the nerve fibres, and that but in rare cases the cells invade the nerve along the septa, either when they have made their way into the intervaginal space or the perivascular spaces of the central vessels.

Agnew and Eno (4) first commented on the fact that the lamina cribrosa is excavated and filled out with a mass of

tumor cells. Bochert (5) assumes that this excavation is due to the direct pressure of proliferating tumor cells which force their way into and push back the lamina cribrosa. Wintersteiner (3) regards this excavation as due to secondary glaucoma. Rompe (6) describes a case where, instead of excavation of the nerve head, papillitis was present. Where the optic nerve was still in a state to recognize the atrophy, this condition was universally found to be present by different authors, except in one case of Knapp's (1) where the nerve was not atrophic though the tumor filled the ball. Wintersteiner (3) describes a case of necrosis of the optic nerve in which the whole nerve, including the central vessels, was necrotic, as a result of impaired blood supply.

BIBLIOGRAPHY.

1. KNAPP, *Die intraocularen Geschwülste.*

2. DA GAMA PINTO, *Untersuchungen über intraoculare Tumoren.*

3. WINTERSTEINER, *Neuroepithelioma Retinæ.*

4. AGNEW and ENO, "A Case of Consecutive Enucleation of Both Eyes for Recurring Glioma," *Trans. Amer. Ophthal. Soc.*, p. 349, 1875.

5. BOCHERT, "Untersuch. über das Netzhaut-Gliom," *Inaug. Dissert.*, Königsberg, 1888.

ROMPE, "Beitrag zur Kenntniss des Glioma Ret.," *Inaug. Dissert.*, Gottingen.

For three of these sections I am indebted to Dr. Wintersteiner of Vienna, for two of the others to Dr. Boerne Bettman of Chicago.

ON ULCUS RODENS CORNEÆ.

By Prof. SCHMIDT-RIMPLER, Goettingen.

Translated by Dr. Ward A. Holden.

(*With three figures on Plate I. of Vol. XXXVIII., Germ. Ed.*)

AN accurate description of the peculiar form of ulceration known as rodent ulcer of the cornea was first given by Mooren,[1] who observed four cases. Since that time a few other observations have been reported (Steinheim, Koll, Beber, Grossmann, Key, Brühl, Jany, Dufour); and lately Ahlström has published the history of a case in *Zehender's klin. Monatsbl.* for May, 1898. This form of ulceration is, however, so rare that not even every busy oculist is fortunate enough to see a case or more in the course of years.

The frequency of its occurrence varies in different localities, and Jany, among sixty-six thousand eye-patients seen in Breslau, found this affection but once.

In the larger German text-books ulcus rodens is usually well described and always in the sense in which Mooren intended. In Michel alone (*Lehrbuch der Augenheilkunde*, 2d ed., 1890, and *Klinische Leitfaden*, 1894) have I failed to find a differentiation of this form of ulceration. He treats of it in conjunction with ulcus serpens corneæ. "The ulcus serpens cornea," he writes, "or rodens, the creeping, phagadenic corneal ulcer called also hypopyon keratitis, represents the type of an infected epithelial defect, and therefore is most fittingly termed an infected or septic ulcer of the cornea."

[1] *Ophth. Beobachtungen*, 1867, p. 107.

In a similar way de Wecker, in the *Traité complet d'opht.* vol. ii., 1886, uses the term *ulcère rongeant* as equivalent to *ulcère infectant*, and adds the characteristics of ulcus serpens, such as rapidity of development, quick progression, and a tendency to perforation. These, however, are characteristics which ulcus rodens lacks. In the *Traité des maladies des yeux* (1894), by Panas, one chapter has as its caption, "*Ulcère rongeant et serpigineux de la cornée*," but ulcus rodens proper is not mentioned.

And elsewhere in books and reports here and there we find descriptions of details which doubtless indicate that this form of ulcer has been confounded with others. It may, therefore, be fitting to discuss the subject anew, and I am led to do this particularly since in a case treated in my clinic last year the enucleation of the ball before the disease had run its course enabled me to make a microscopic examination of the affected cornea, which, so far as I know, has not previously been done.

The patient was a man of thirty-one, otherwise healthy; he was pale, but his muscles and fatty tissue were well developed. The patient has never been seriously ill, and careful examination revealed no disease of any of the other organs. In April, 1897, without any known cause the left eye became red and painful and a corneal ulcer developed that was treated with fomentations, drops, and the cautery, in Hannover. About the end of August he came to my clinic. The left eye was much reddened. The cornea showed an ulcer, not deep but occupying a great part of the periphery of the cornea, only the inferior third of the periphery being free. At some points in the corneal margin a gray vascular cicatricial tissue covered the seat of ulceration. The floor of the ulcer was transparent, but of grayish appearance. Vessels entered it from the periphery. The margin of the ulcer on the side toward the healthy centre of the cornea was somewhat gray and perceptibly undermined. Even the preserved portion of the cornea, which had a vertically oval form, reaching from the inferior margin of the cornea up opposite the centre of the pupil, was slightly cloudy. On Descemet's membrane were fine deposits, at the bottom of the

anterior chamber a small hypopyon; there was also iritis with posterior synechiæ. The patient could see movements of the hand at 25 *cm*, visual field free, tension normal. In spite of treatment by repeated paracentesis, peridectomy, iodoform, nosophen applied to the margins of the ulcer, scraping, the constant current, subconjunctival injections of sublimate, sublimate pills, and diaphoresis, the process extended in the following months. The unaffected portion of the cornea gradually became smaller and the portion previously ulcerated cicatrized, forming an extensive leucoma. At times the progress ceased and the ulcer became transparent, but a relapse always occurred. By the middle of November the unaffected islet of cornea remaining was about 3 *mm* broad and 4 *mm* high. Above and to the temporal side the previously ulcerated area was partly filled with opaque vascular scar tissue as far as the unaffected islet. At other points the new scar tissue was still separated from the unaffected portion by the ulcer. With a sound the margin of the ulcer could be raised up and even turned over at some points. Anæsthesia, which has sometimes been found, did not exist here, and the introduction of nosophen beneath the margin had to be discontinued on account of the severe burning.

The pupil could not be seen, a small hypopyon lay behind the still transparent cornea, the patient could only recognize a candle flame, projection was not certain, and at times, particularly when the process was advancing, there was severe pain.

On account of the pain and the long duration of his illness, which greatly interfered with his business, the patient demanded that the eye be enucleated and would not listen to our counsel to have more patience. Enucleation was done on November 19th. Nine months later the patient sent word, with expressions of thanks, that he had remained well.

While in the clinic, scrapings from the floor and from the margins of the ulcer were several times examined with the microscope, but always with negative results. Before the enucleation the eyeball was washed off, and particles of the margin of the ulcer and a bit of the cornea were inoculated

on agar and gelatine. In one preparation of a scraping of the ulcer, long search revealed some cocci. In tubes which were inoculated with the secretion, a typical culture of the staphylococci pyogenes aureus developed. The tube inoculated with the bit of cornea remained sterile.

The corneas of three rabbits were inoculated with the staphylococcus culture. In all, elevated, slightly purulent infiltrations appeared, with cloudiness of the surrounding cornea and iritis, without hypopyon. These infiltrations were recovered from in 5 to 12 days and only white opacities remained. This is the course one usually sees after inoculation with a moderately septic staphylococcus. There is then no question of a specific action of these cocci obtained from the rodent ulcer nor can they explain the peculiar course of this form of ulceration.

After dividing the eyeball in a horizontal plane after it had been put into Müller's fluid for two weeks and then into alcohol, it was seen that the pupillary border of the iris lay against the cornea, while the periphery of the anterior chamber was still preserved. The periphery of the cornea on each side was thickened and superficially cloudy; on the temporal side this thickened portion passed over into the relatively transparent central portion of the cornea, while on the nasal side the ulcer lay between the thickened portion and the transparent centre (Fig. 1, Pl. I.).

Microscopically it was found that a thickening of the conjunctiva, consisting of hypertrophied connective tissue, blood vessels, and proliferated epithelium, began at the scleral limbus and continued over the cornea, forming its superficial layer. Beneath this was a fairly normal corneal tissue in which there was an increased number of cells. This corresponded to the peripheral portions where the ulceration had already undergone cicatrization. The membrane of Descemet with its endothelium was present everywhere except at the points where the iris rested on the cornea in consequence of the repeated punctures. The thickness of the normal corneal tissue beneath the scar varied from one half to one sixteenth of the entire thickness of that membrane, the latter relations being near the periphery of the cornea. The epithelium, which was composed of several layers of cells, at

many points sent processes down into the underlying tissue. The latter contained many cells and, as compared with the corneal lamellæ, appeared opaque and of irregular structure.

On the temporal side where the ulcer had healed entirely up to the remaining portion of the cornea, the transition to the normal cornea was gradual, the epithelial layer becoming thinner, and the number of infiltration cells becoming smaller.

On the nasal side of the cornea where the ulcer still existed, cicatrization had begun at the periphery. The boundary here between the epithelium and the deeper surface of the ulcer was characteristic ; there was found a prominent rounded elevation consisting of numerous epithelial cells, many blood vessels, and infiltrating cells in the ground substance. At some points the inferior layer of epithelial cells could be seen as a single layer curving over the elevation and then bending backward at the margin of the ulcer. Vessels cut transversely were found in great number in sections of the elevation, as if a ring of vessels had surrounded the periphery of the ulcer (Fig. 2). The neighboring tissue was also densely infiltrated with cells which in part were arranged in tracts. Beneath the floor of the ulcer were many vessels, and a considerable number of cells lay superficially and also extended into the deeper tissues, at some points reaching even the membrane of Descemet, although here the cornea was nearly normal in structure. An absorption of these cells must have taken place with the cicatrization, for this infiltration was wanting in the localities in which the ulceration had healed. At the place where the ulcer passed over into the central, normal portion of the cornea it was shallower ; and here there was a rather extensive detachment of the fairly normal epithelium, corresponding to the undermined central margin of the ulcer. Bowman's membrane was detached with the epithelium from the cornea proper, which was here fairly normal, except for the presence of some round cells (Fig. 2). At other points, however, there was a denser cellular infiltration and even vessels were to be seen here and there (Fig. 3). Thus was explained that difference in the color of the margin of the ulcer which was macroscopically perceptible.

No bacteria could be discovered in the corneal tissues.

On the inner surface of Descemet's membrane were clumps of cells. The iris lay in opposition to the cornea in its central portion and here the membrane of Descemet was often wanting.

The iris was thickened in places and infiltrated with cells, and accumulations of cells were found also on its surface. Examination of the posterior portion of the uveal tract revealed, in general, normal conditions. In the retina, particularly near the disc, the fibres of Müller were hypertrophied. Hemorrhages were seen here and there in the nerve-fibre and ganglion-cell layers. About these hemorrhages were many round cells, and lymphoid cells were found scattered elsewhere through the nerve-fibre layer. At some points the limitans interna was broken through. Some round cells lay in the peripheric layers of the vitreous. At one point between the pigment epithelium and the rods and cones there was a circumscribed granular exudation containing red and white blood corpuscles and round cells filled with pigment.

The microscopic examination of the corneal ulcer confirmed the macroscopic observation as to the undermining of the central margin of the ulcer; there was an actual elevation of the epithelium, which appeared at first without any infiltration of the corneal tissue. At the peripheral margin of the ulcer, however, there was a hemispherical elevation, caused by proliferation of the epithelium and particularly by an enormous development of new vessels. The moderate depth of the ulcer is also revealed in the preparations: the defect corresponded for the most part to one third of the thickness of the cornea and in some places to two thirds. It is noteworthy, too, that the retina was somewhat affected.

Turning to the clinical aspect of rodent ulcer, we find that it always begins as a narrow but extended ulceration along the corneal margin. This gradually creeps along the corneal margin without going deep, and also gradually approaches the centre of the cornea. The margin toward the centre of the cornea is of light gray color and is always undermined, the epithelium being elevated. The central, unaffected portion of the cornea is often somewhat cloudy, and near the ulcer there may be infiltrations.

As the ulcer spreads toward the centre of the cornea, numerous parallel vessels run from the periphery into the base of the ulcer, and later, more vessels developing, the

peripheral portion of the ulcer in a characteristic way is transformed into a whitish vascular scar, while the ulcer still progresses toward the centre of the cornea. At times the process may come to a standstill, but later the ulceration extends again, each relapse being accompanied with severe pain. As a rule the entire cornea becomes leucomatous. The first four cases which led Mooren to describe this as a particular form of disease, all led to blindness, and in three of the patients the blindness was bilateral. In some cases, however, the process ceases, leaving a partial leucoma, principally peripheral. At times also there may be a slight clearing up, even of a leucoma that is total. The disease may attack the old or the young, but it has never been seen in children. Although some writers have maintained that there is a special cachexia that gives rise to the disease, this does not hold good for a number of the cases. As to differential diagnosis, it is clear that ulcus rodens differs entirely from ulcus serpens, and cannot be classed with the latter. First, the location is different, the serpent ulcer beginning usually in the centre of the cornea and extending toward the periphery, while the rodent ulcer is a marginal ulcer which spreads toward the centre. The serpent ulcer, furthermore, has a tendency to perforate, and when it is extensive there is always hypopyon; the rodent ulcer, on the contrary, remains always superficial, has no tendency to perforate, and hypopyon may be absent even when the ulcer is very extensive, or if present it may be very small. Then, the rodent ulcer heals at its outer margin while the inner extends.

Ulcus rodens might be more readily confounded with the shallow marginal ulcers seen in old people. These ulcers sometimes extend round the entire periphery of the cornea. The course, however, is different, for here the periphery does not heal with the new formation of vessels and thickening of the tissues, while centrally the ulcer extends; furthermore, these ulcers have not the undermined gray margin and they are more transparent.

Occasionally one observes a particular form of marginal ulcer, which I have designated in my text-book, *chronic*

peripheric furrow keratitis. In this affection a varying portion of the periphery of the cornea exhibits a zone about 1 *mm* broad of light gray opacity (somewhat resembling gerontoxon); this opacity is bounded centrally by a deep, transparent furrow. Scattered vessels enter the marginal opacity, and to some extent the furrow-like ulcer; pain and signs of irritation are, as a rule, absent, yet in some cases there is periodic inflammation. This condition may last for years and remain limited to one portion of the cornea. There is never extension centrally as in rodent ulcer. At the beginning the two might be confounded, and I believe that in many of the cases of rodent ulcer reported cured, the writer had been dealing with another form of ulcer.

As to the etiology, we are still uncertain. Bacteriological examinations in part have been negative (Key), in part have revealed no specific cause to explain the peculiar course of the disease (Ahlström, and this and other cases examined by myself). The characteristic interrupted progression of the ulcer may be explained perhaps by the unusual elevation of the epithelium which precedes each fresh advance. Under this protecting epithelium, as in a pocket, micro-organisms from without could collect, and when their toxic action had reached a certain degree an infiltration would occur in the neighboring corneal tissue, followed by necrosis. The differences in the microscopic findings near the elevated epithelium favor such a view. The epithelial flaps which could be lifted and turned over with a sound might act also as a foreign body, like an inverted lash, irritating the floor of the ulcer.

The idea held by Ahlström and others that an anæsthesia of the corneal nerves may account for the process seems to me untenable. In one case anæsthesia often did not exist, and the course differs materially from that observed in neuro-paralytic keratitis due to affections of the fifth nerve. The bilateral occurrence of the ulceration also makes this explanation doubtful. And constitutional diseases which might be the underlying cause are not always to be found, although the finding of a retinal affection in my case was suspicious.

As to therapy, the destruction of the margin of the ulcer has been in several cases of questionable value; although Jany had used it with good results in his case. But when Fuchs writes in his text-book that by this means the ulcer can be healed "with certainty" the expression is perhaps too optimistic. Ahlström's case, Dufour's case, the present case, and others prove this.

In a woman of sixty-one, whom I treated at the beginning of the year for a rodent ulcer at the nasal periphery of the cornea, the ulcer spread in spite of the cauterization. On February 26th I covered the ulcer with a ribbon-shaped flap of conjunctiva with a pedicle above and below which was drawn over the nasal margin of the cornea with sutures. In spite of the fact that the flap was torn through in the middle when the dressing was changed March 3d, the ulcer had a good appearance. On March 12th, however, another sudden extension occurred with infiltration and necrosis of the central margin. On March 15th, after scraping away the latter, the ulcer was again covered with a conjunctival flap, this time taken from below. When the dressing was changed, March 19th, the flap was found to be somewhat out of place but the ulcer had not extended and was in the process of healing. When last seen, August 26th, recovery was complete, there was a leucoma at the previous seat of the ulceration, and vision was $\frac{20}{50}$. Perhaps covering the ulcer hindered the entrance of micro-organisms beneath the marginal epithelium. In another case cicatrization was brought about by doing peridectomy, repeatedly making paracentesis of the base of the ulcer, applying warm fomentations, and freely instilling aqua chlorata.

In the discussion which took place in the French ophthalmological society after the reading of a paper by Dufour,[1] Augiéras recommended subconjunctival injections of sublimate, Jocqs the abscission of the overhanging margin and cauterization with one per cent. sublimate solution, and Dufour the cauterization with twenty per cent. alcoholic solution of carbolic acid.

However, the most rational treatment would seem to be

[1] "L'ulcère rongeant de la cornée," *Ann. d'ocul.*, 1897, i., p. 345.

cauterization and scraping, and possibly covering the ulcer with conjunctiva, although, as has been said, one cannot always expect a good result.

The resulting leucoma sometimes clears up in the course of years, although after the surface of the entire cornea has been destroyed one would scarcely expect to obtain useful vision. Since in this disease one is always certain that the deep layers of the parenchyma of the cornea and the membrane of Descemet are preserved, von Hippel's method of corneal transplantation might well be tried.

Explanation of the Figures.

FIG. 1.—Horizontal section of the cornea, sclera, and iris. Slightly magnified.

ek. Ulcus rodens.

e. Elevated epithelium at the spreading margin of the ulcer.

k. Nodular thickening in which the scar tissue ends which has covered the ulcer in the nasal portion (*n*) of the cornea. Beneath the scar tissue there is fairly healthy cornea.

c. Intact cornea; the ulcer which had existed on the temporal side is cicatrized.

i. Iris, thickened in some parts. At places it is adherent to the cornea as a result of the repeated paracenteses.

p. Pupillary region.

FIG. 2.—The same section, in the region of the ulcer. Winkel obj. 4, oc. 1.

e. Elevation of the epithelium. Beneath it a few cells in the tissues.

k. Nodular thickening due to several superimposed layers of epithelium. Numerous blood vessels cut transversely. To the nasal side (*n*) the cicatricial tissue with cells and blood vessels resting on the deep layers of the cornea. The membrane of Descemet is everywhere preserved, and the endothelium is visible in some places.

FIG. 3.—A section through the temporal edge of the ulcer. Leitz obj. 3, oc. 4.

Elevation of the epithelium, beneath which is an infiltration with round cells. Many vessels lie just beneath the epithelium. The deeper layers of the cornea are still intact.

EXPERIMENTAL INVESTIGATIONS ON THE EFFECT OF POSTERIOR SCLEROTOMY.[1]

By Dr. THEODOR TOBLER, Basle.

(With four figures on Plates IV.–V. of Vol. XXXVIII., German Edition.)

Slightly Abridged Translation by Dr. Ward A. Holden.

POSTERIOR sclerotomy was first performed by Mackenzie in 1830.[2] He introduced a broad iris knife at the spot where it was customary to introduce the needle in the couching operation for cataract. After the knife had been pushed toward the centre of the eye it was turned a little on its axis in order to permit vitreous to escape.

Much later de Luca [3] employed the operation without mentioning Mackenzie's name. He entered a lance-shaped knife 5–6 *mm* behind the limbus between the external and the inferior rectus and evacuated a portion of the vitreous. Both of these authors recommended the operation in glaucoma as a good means of decreasing tension in eyes which still had vision, and of relieving pain in eyes that were amaurotic.

Since de Luca's paper, posterior sclerotomy has been frequently mentioned in literature, and modified in various ways. It was believed that if the tension of an eye did not diminish after iridectomy or increase with fresh signs of irritation, an exudation had taken place into the vitreous, and therefore sclerotomy was indicated.

Further indications were lack of restoration of the anterior

[1] From the laboratory of Prof. Mellinger's University Eye Clinic.
[2] Mackenzie, *Ophth. Hosp. Reports*, xi., April, 1860.
[3] De Luca, *Ann. di Ottalm.*, 1872, p. 155.

chamber after iridectomy, and absolute glaucoma. In the latter the operation was done to avoid enucleation.

Later posterior sclerotomy was recommended in detachment of the retina and according to Ware,[1] Sichel,[2] Kittel,[3] and de Wecker[4] it was sometimes followed by good results.

In 1871 Hansen[5] criticised the operation as injurious and unsafe, while others recommended it.

In 1888 Masselon said: "After having performed equatorial sclerotomy, varying the section as regards direction, extent, and position, I have arrived at the conclusion that the best results are obtained by a simple transverse puncture made with the Graefe knife a little distance behind the ciliary body and toward its infero-external portion—a puncture that must sometimes be repeated in order to secure a permanent result. According to my experience it is necessary in general to hold to the scleral puncture of the ancients. That puncture, said Guérin, should be simple and performed without many instruments. One needs only a large cataract needle. The Graefe knife of our day, having a width of 2 *mm*, is quite sufficient.

"The cases in which I have employed equatorial sclerotomy were for the most part cases of very advanced or absolute glaucoma, or the eyes were such as had not been benefited by a previous iridectomy.

"In the great majority of cases the effects of the puncture have been most happy."

At the same session of the Soc. franç. d'opht., Parinaud[6] said: "I have practised equatorial or retrociliary sclerotomy by entering a Graefe knife, turning it 90°, and withdrawing it, thus producing a small triangular opening in the sclera particularly favorable to filtration."

Vacher[7] said: "In two cases in which anterior sclerotomy failed I practised equatorial sclerotomy. My incision was

---

[1] Ware, *Mackenzie's Remarks on the Ophthalmias*, London, 1814.
[2] Sichel (père), *Clinique Européenne*, 1850, No. 29.
[3] Kittel, *Wiener allg. med. Zeitung*, 1860, No. 22.
[4] De Wecker, *Traité des mal. du fond de l'œil*, etc., Paris and Vienna, 1870.
[5] Hansen, "Bemärkinuger am nethinde lösningens behandlung," *Hosp. Tid.*, 1871, No. 16. Masselon, *Rev. génér. d'opht.*, 1888, vii., p. 208.
[6] Parinaud, *Rev. génér. d'opht.*, 1888, vii., p. 209.
[7] Vacher, *ibid.*

of 2–3 *mm* only. There was temporary relief, and six months later I found at the place of incision three bulging tumors, indicating that the glaucomatous process had continued its course."

De Wecker [1] also stated that the results were transitory, although when indicated repeated posterior sclerotomy might be of great benefit. By this operation he had seen staphylomas of the cornea of considerable extent reduced in size when iridectomy has been fruitless. This operation, he thought, should be more accurately studied.

Parinaud did not believe that evacuation of vitreous was the essential feature of the operation. He maintained, on the contrary, that the best results were obtained in cases in which no vitreous escaped. The tension does not fall immediately after the operation, but only after the lapse of two or three days, and the effect must be preserved by massage. When a T-shaped section was made he had seen a permanent subconjunctival fistula remain, which he regarded as advantageous.

Motais [2] endeavored to secure a fistula of this sort and made a meridional section 8 *mm* long.

Galezowski [3] made a meridional sclerotomy, entering a Graefe knife posteriorly and prolonging the section forward to the ciliary body.

Simi [4] made an equatorial incision through the sclera 4 *mm* long without injuring the choroid.

Wolfe [5] used posterior sclerotomy chiefly in cases of detachment of the retina, making an incision 8–12 *mm* long in the region of the greatest detachment.

In our clinic also posterior sclerotomy has been done, with permanent results, in cases of malignant glaucoma when the anterior chamber is not restored after iridectomy.

Schiess-Gemuseus [6] reported a case of secondary glaucoma with very severe pain, which was relieved by multiple pos-

[1] De Wecker, *Rev. génér. d'opht.*, 1888, vii., p. 209.
[2] Motais, *Annales d'ocul.*, 1887, xcvii., p. 251.
[3] Galezowski, *Rev. génér, d'opht.*, 1888, vii., p. 207.
[4] Simi, *Bull. d'oc.*, 1887, iv., 3.
[5] Wolfe, *Annales d'ocul.*, 1884, xci., p. 149.
[6] Schiess-Gemuseus, *28th and 30th Annual Reports of the Ophthalmic Institute at Basle.*

terior sclerotomies. He reported further a case of subacute glaucoma with retinitis pigmentosa in one eye in which iridectomy was done. Since the anterior chamber did not become restored sclerotomy was done. Repeated elevations of tension necessitated repetition of the operation in order to relieve all the symptoms of irritation.

Later observations on the favorable action of posterior sclerotomy led us to undertake some experiments to determine its manner of action. Both meridional and equatorial sclerotomy have been employed, and we wished to discover which was the better and in what way each worked. The fact that posterior sclerotomy to be of permanent effect must often be repeated led us to make some observations on the conditions of healing.

My thanks are due to Prof. Mellinger for suggesting this subject and for assisting me in the work.

Which is preferable, the meridional or equatorial sclerotomy?

In order to determine whether the meridional or the equatorial section is preferable, both as regards the longer gaping of the wound and as regards lesser injury to the eye (as seen with the ophthalmoscope), we made experiment on rabbits, choosing white animals with eyes free from pigment.

The sclerotomy was performed with a Graefe knife introduced 5–6 *mm* behind the corneal margin between the superior and internal recti. For accurate comparison an equatorial section would be made in one eye and a meridional in the other eye of the animal.

It was found that the meridional sclerotomy wound gaped more and was followed by less hemorrhage than the other.

From our records we may give the following examples:

First Experiment.—Right eye. In a white rabbit with normal eyes, after instillations of cocaine, the eye was luxated forward by pressing the broad handle of a scalpel against the lower lid, and a meridional sclerotomy was made at the usual place. When the knife was withdrawn liquid followed, elevating the conjunctiva somewhat.

Ophthalmoscopically one can see the wound in the choroid and retina, which gapes in its entire length and particularly in its

middle portion, and exhibits a dark ground. At the lower end of the wound is a small hemorrhage. The choroid and retina appear to be retracted, so that a border of white sclera surrounds the wound (Fig. 1, Pl. IV.–V.).

On the second day there was still some chemosis of the bulbar conjunctiva near the wound and a slight injection. The eyes could be opened normally and there was no increased secretion.

Ophthalmoscopically the media were clear. The wound gaped more than on the first day and still showed a black ground. The blood was for the most part absorbed.

On the third day the bulbar chemosis had disappeared, and only a slight conjunctival injection indicated the place where the sclerotomy had been made. Otherwise the eye externally appeared normal.

Ophthalmoscopically the media appeared clear and scarcely a trace of blood remained. The wound appeared broader than before and its ground was gray with some points of red. The sclera can be seen along the lower periphery of the wound only, while along the upper periphery the choroid and retina are greatly reddened and appear to be turned inward.

On the fourth day there was still slight conjunctival injection in the region of the sclerotomy, but otherwise the eye was entirely free from irritation.

With the ophthalmoscope the wound was seen to gape more than before, and from the red points previously noted on the gray ground vessels had developed (Fig. 2, Pl. IV.–V.).

Second Experiment.—Left eye. An equatorial posterior sclerotomy was made between the superior and internal recti of the left eye under the same precautions as in the right. Liquid escaped when the knife was withdrawn.

Ophthalmoscopically the wound could not be seen on account of hemorrhage into the vitreous. Four hours after the operation there was considerable chemosis in consequence of subconjunctival hemorrhage. The blood in the vitreous having then sunk down, the wound could be seen as a horizontal narrow cleft with a dark ground bordered by a line of shining white sclera. Below the incision in its entire extent was a collection of blood, and the retina itself about the incision was suffused with blood (Fig. 2).

On the second day there was still considerable chemosis and injection of the conjunctiva.

Ophthalmoscopically the region of the wound had not changed

in appearance, and blood was present in the vitreous in greater amount than before.

On the third day the condition was about the same nor was there any noticeable change in the ophthalmoscopic condition on the fourth day (Fig. 4).

The rabbit was killed, and the eyeballs were enucleated and put into 10% formol for two days, then into alcohols of increasing strength, and finally cut in celloidin in 10–15 μ sections.

Microscopic examination of the right eye (*meridional sclerotomy*).

The retina was detached from the ora serrata up to a point 0.2 *mm* from the gaping wound by a small quantity of blood that had escaped from the choroid. The greatest width of the wound was 0.614 *mm*. At both margins of the wound the retina was thickened and curved outward. A similar thickening was found in the choroid, which in the entire extent of the wound had pushed out into the episcleral tissue.

Microscopic examination of the left eye (*equatorial sclerotomy*).

When the eye was divided a considerable blood-clot escaped. The conditions of the choroid and retina were similar to those found in the other eye except that no hemorrhage was found beneath the choroid. In the sclerotomy wound was a large hemorrhage. The greatest width of the wound was only 0.18 *mm*.

Six similar experiments led to similar results. The bleeding was always more excessive in the cases of equatorial sclerotomy, and the gaping of the wound was less. The meridional incision was therefore found to be preferable on both accounts. The greater hemorrhage following equatorial incisions is due to the fact that more vessels are cut through; and the greater gaping of meridional wounds is due to the action of the recti muscles, which force together incisions perpendicular to their direction and force apart incisions parallel to their direction.

Is there, after posterior sclerotomy, a communication between the intrabulbar space and the subconjunctival space, and what is its nature?

The first and most direct effect of posterior sclerotomy is a marked diminution of tension and lessening of pain. The tension falls even when no vitreous escapes, and Simi has

proposed, therefore, a posterior sclerotomy in which the sclera only is punctured, while the retina and choroid are not injured.

In most cases the operation must be repeated once or oftener, since the wound seems soon to close, and the previous condition is then restored.

From our clinical experience so far, it is not evident to what the effect of posterior sclerotomy is due. Animal experiments alone can give us information in this regard. Principally we sought to discover by experimental means what sort of communication between the intrabulbar space and the subconjunctival space was brought about by the operation.

For this purpose white rabbits with healthy eyes were used, and disinfection and anæsthesia were carried out as in the previous experiments. Subconjunctival injections of Berlin blue, carmine, India ink, and Ehrlich's methylen blue were made. The India ink was prepared as follows: A stick of Japanese ink was rubbed off with 1 % bichloride solution, then washed with warm physiological salt solution, and finally rubbed up in the latter solution.

First Experiment.—Subconjunctival injection of an emulsion of India ink after posterior sclerotomy.

A meridional sclerotomy was made, and immediately an entire hypodermic syringeful of the emulsion was injected. The ophthalmoscopic picture did not differ from that seen in the preceding cases. The rabbit was killed and the eye enucleated thirty hours after the operation. The greatest width of the wound was 1 *mm.* The choroid and retina were adherent to the margins of the wound on both sides. The coloring matter had extended from the subconjunctival space directly back along the sclera, passing round the wound and ending in the musculature of the ball near the optic-nerve entrance. At no point did the color pass into the wound.

Second Experiment.—Subconjunctival injection of an emulsion of Berlin blue after posterior sclerotomy. A meridional posterior sclerotomy was made, and twenty hours afterward a hypodermic syringeful of Berlin blue was injected, producing an extensive chemosis. Six hours later the rabbit was killed and the eye enucleated. None of the color had passed into the wound.

Several other experiments led to like results. The fact that the coloring matter never entered the wound, but seemed rather to be forced away from it, led us to make some experiments on the eyes of dead animals.

Third Experiment.—A rabbit was killed, and two hours later a meridional sclerotomy made and a syringeful of India ink injected beneath the conjunctiva. Two hours later the ball was enucleated and divided. It was found that a considerable quantity of the color had entered the wound and collected in the anterior portion of the ball.

Fourth Experiment.—A meridional sclerotomy was made two hours after death on the other eye of the rabbit just mentioned, and immediately afterward a syringeful of aqueous carmine emulsion was injected beneath the conjunctiva. The ball was enucleated two hours after and the carmine was found to have passed through the wound and a red tract could be followed toward the disc.

Repetitions of these experiments gave like results. The coloring matter seemed sometimes to take a direct course from the wound toward the disc, and in other cases to remain in the anterior portion of the ball. Similar experiments made on the eyes of decapitated sheep with a special apparatus for the gradual injection of the coloring matter (Experiment 6) merely confirmed the previous results. It thus became evident that in the living eye after posterior sclerotomy no communication exists between the subconjunctival space and the interior of the eyeball. On the other hand, liquids injected beneath the conjunctiva of the dead eye readily pass into the interior when a posterior sclerotomy has been made. The explanation of these facts seemed to be as follows: The living eye, through its rich blood-supply, particularly in the choroid, has so high a tension that liquids injected beneath the conjunctiva cannot enter through a scleral wound, but, on the contrary, are carried away from the wound by a current proceeding from within the eye. After death the blood passes out of the eye and tension sinks, so that liquid from without can pass through the scleral wound.

These considerations led us to undertake the following experiments:

Seventh Experiment.—Injection of India ink into the vitreous and performance of posterior sclerotomy immediately after.

Into the vitreous of a rabbit we injected one third of a syringeful of India-ink emulsion, and at once a posterior sclerotomy was made. As the knife was withdrawn, a black chemosis appeared which spread quickly over the entire visible portion of the conjunctiva. With the ophthalmoscope only a dark reflex could be seen. The rabbit was killed ten minutes after the operation and the ball enucleated, placed in 10 % formol solution, and later divided. No India ink remained in the vitreous. The entire quantity had passed out into the subconjunctival space.

Eighth Experiment.—Injection of India ink into the vitreous and performance of a posterior sclerotomy twenty-four hours later. The result here was practically the same as in the preceding experiment.

Ninth Experiment.—Sclerotomy forty-eight hours after injection. Here the ink was found for the most part in and about the wound and in the subconjunctival space.

From these observations it appears that a posterior sclerotomy induces a strong current from the interior of the eye into the subconjunctival space. That this is not due alone to the increased tension directly following the experimental injection of liquid into the vitreous is proven by the cases in which the sclerotomy was made a day or two later.

We know, furthermore, that in man this operation is always followed by a rush of liquid under the conjunctiva. Experiments on rabbits have shown that this liquid appears even in the case of healthy eyes. This is a watery liquid which on evaporating leaves the characteristic crystals of sodium chloride. Vitreous escapes only when the incision is very large or the rabbit unruly.

The results of posterior sclerotomy are known to be tran. sitory, and it is of importance to know exactly when the wound closes. In our experiments we found that the wound closed and checked any outflow of liquid about the eighth day.

Our conclusions arrived at after experiments on rabbits may be summed up as follows:

1. The meridional sclerotomy gapes more and bleeds less than the equatorial and hence is preferable to the latter.

2. In the living eye a posterior sclerotomy does not give rise to a current from the subconjunctival space into the interior of the eye, but this occurs in the dead eye.

3. After a posterior sclerotomy a centrifugal current arises, passing from the interior of the eye through the section into the subconjunctival space.

4. The liquid which escapes through the wound is watery and contains salt.

5. The wound may be expected to close by the eighth day under normal circumstances.

Explanation of the Ophthalmoscopic Drawings on Plates IV.–V.

Fig. 1.—A fresh meridional sclerotomy; at its lower end a small hemorrhage projecting into the vitreous; the sclera surrounds the incision as a white bordering line.

Fig. 2.—The same sclerotomy on the 4th day; beginning vascularization of the base of the wound.

Fig. 3.—Equatorial sclerotomy, four hours after operation; narrow, gaping wound, surrounded by white sclera; at the lower end a hemorrhage; the principal part of the hemorrhage has sunk down in the vitreous.

Fig. 4.—The same sclerotomy on the fourth day.

A CLINICAL CONTRIBUTION TO THE SUBJECT OF UNILATERAL NYSTAGMUS.[1]

By Dr. OTTO NEUSTÄTTER, Munich.

Abridged Translation by Dr. Ward A. Holden.

CASES of unilateral nystagmus are great rarities. In the entire literature since Graefe's paper in *Graefe-Saemisch* I have found only twenty-five cases.

Graefe and also D'Oench (1888) recognized but a single form of unilateral nystagmus, namely, the vertical; of horizontal they made no mention. It is true that unilateral nystagmus is most frequently vertical and rarely horizontal, a relation opposite to that found in bilateral nystagmus. Of the twenty-five cases reported only three were of horizontal nystagmus (two reported by Gordon Norrie and one by R. Sachs), the twenty-two others being vertical.

Unilateral rotatory nystagmus in the primary position has never been alluded to, nor has diagonal nystagmus.

In the course of my attendance at Dr. Samelsohn's clinic two cases of unilateral nystagmus appeared within a few days of each other, and later two more; they represented all the types of nystagmus that can be imagined, namely, vertical, horizontal, rotatory, and diagonal.

The first case was in a boy of seven who was born at the seventh month. Since his birth, or soon after, his mother has noticed twitching movements of the right eye. These had decreased in extent as well as in the frequency and duration of the attacks as he grew older, but they had not ceased entirely. No relative of the child was afflicted in a similar

[1] From Dr. Samelsohn's clinic at Cologne.

way. The patient was somewhat pale and of delicate appearance, and his head was relatively large. The musculature of the face, and of the mouth particularly, kept up continued irregular movements which were very pronounced in the forehead and eyebrows when an effort at fixation was made. The hands also twitched and were rarely quiet. The patient was not conscious of any of these movements.

Externally the eyes appeared normal. R v = fingers at 4 *m*, with $-8.D\ \frac{6}{8_0}$; L v = fingers at 5 *m*, with $-8.D\ \frac{6}{8_0}$. There was periodic divergent strabismus. With the stereoscope the images were united, but the patient failed on Hering's test with the falling balls. With a red glass no double images were seen, but with a prism, base down, there was homonymous diplopia, sometimes becoming crossed, the image of the right eye not moving. Visual fields normal.

If one watched the right eye of the patient when his attention was not called to any object in sight there was rarely any twitching to be seen, but as soon as his attention was directed to a certain object, whether near or far away, a horizontal nystagmus appeared in the right eye. There were about two hundred short oscillations to the minute.

When the gaze is directed downward the nystagmus of the right eye ceases except for an occasional irregular twitching movement. When the gaze is directed to the left the nystagmus sometimes ceases and always becomes less, but even in this position there will be occasional irregular twitching movements. When the gaze is directed to the right the nystagmus diminishes, but there is a regular rotatory nystagmic movement. When the gaze is directed upward there is a very marked increase in the amplitude of the horizontal twitchings. If these movements were not perceptible in the primary position of the eyes they became manifest at once when the gaze was directed upward.

Binocular fixation can be maintained until the object fixed is brought to a point 5 *cm* from the eye. When brought still nearer the right eye diverges. (I may state here that the right eye exhibits an unusual form of unilateral periodic divergent strabismus. It never remains long in the position of fixation, but slowly diverges and then comes back again, while the left eye remains absolutely at rest.) But when the object fixed is brought to a point

8 *cm* from the eye the nystagmus of the right eye ceases entirely after having gradually become slower.

A prism of 18° held base in before the right eye has no influence upon the nystagmus, but when held base out it is often possible to cause the nystagmus to cease even when the object fixed is ½ *m* distant.

The left eye at the first two examinations remained at rest in all positions. Later, after long-continued fixation, at times slow horizontal movements appeared. When the gaze was directed upward the horizontal movements increased, becoming quicker, more extensive, and more regular. They were about 76 to the minute, the movements of the right eye at the same time being 200. When the gaze was directed downward, inward, or outward, the eye remained at rest, excepting a slight rotatory twitching in the last position. The general condition described was not essentially altered by covering either eye. It was noted, however, that when the left eye was closed and an object was fixed with the right eye, the nystagmus ceased for some moments and then began again. In adduction the nystagmus ceased entirely and did not begin again; in looking down it ceased except for occasional slow, horizontal twitching movements; in abduction the horizontal nystagmus passed suddenly into slow, regular, rotatory movements.

When the right eye was covered and an object fixed with the left the nystagmus continued as usual in the right, while the left remained still. When both eyes were closed, vertical trembling movements of the lids were noticed and the eyes now and then made wandering movements which were for the most part rightly associated, although there was a varying divergence just as when the eyes were open. Whether the nystagmus continued could not be made out.

The internal rectus was advanced with some idea of relieving the nystagmus, since there are cases reported in which a strabismus operation was followed by cessation of the nystagmus (Raehlmann, *Graefe's Archiv*, xxiv., 3, and Kugel, *ibid.*, xxxvi., 3). But although the strabismus was corrected the operation had no effect upon the nystagmus, nor did prisms have any effect. Examination by Professor Samelsohn a year later showed some improvement: nystagmus came on only after long fixation, and the vision was better.

I have reported this case in detail on account of its rarity. We have here, speaking accurately, a condition of unilateral nystagmus that is pure at times only, but may be classed in the category of unilateral horizontal nystagmus.

The second case that I was able to observe was one of unilateral vertical nystagmus of less interest. This resembled a case described by Raehlmann in coming on without any assignable cause. Norrie also saw two cases of unilateral nystagmus, but these were due to trauma, were accompanied by torticollis, and recovered after a time.

My case was as follows:

The patient was a strong and healthy man of twenty-four, on whom Dr. Samelsohn had done a tenotomy for right convergent strabismus twelve years before. At that time there was no nystagmus, and the patient states that he had first noticed the twitching a year and a half before. Now there is vertical nystagmus and also secondary divergent strabismus of the right eye. The deviating eye fixes in convergence up to 20 *cm* with an effort, within this distance the eye diverges about 3 *mm*. With fixation at 20 *cm* the nystagmus is less, and at 18–14 *cm* it ceases entirely. The moderately rapid short vertical movements of the right eye cease almost entirely when the eye looks to the right or left, or when it looks up or down.

When the left eye is closed and the right eye alone fixes an object the nystagmus ceases, whatever may be the direction of the gaze. As soon as central fixation is disturbed the deviating right eye becomes subject to vertical nystagmus. After some efforts it was possible to produce diplopia by means of prisms. The patient stated that the image of the right eye remained fixed even while the eye was twitching.

In the right eye the nasal portion of the field was contracted to 30°. Vision was only $\frac{12}{200}$, although after the operation, twelve years before, it was $\frac{6}{36}$.

After a tenotomy of the right external rectus and an advancement of the internal rectus, the position of the eye was correct and the nystagmus had ceased. In three weeks the vision in the right eye improved to $\frac{5}{60}$; L with correcting concave cylinder, V = $\frac{6}{6}$. A year later there was no sign of nystagmus, and V = $\frac{6}{60}$.

It was interesting to observe that the images of the right eye apparently did not move, although the nystagmus was acquired. In acquired bilateral nystagmus the images always appear to move. In one of Graefe's cases of unilateral nystagmus that was not acquired there was apparent movement of the images when the normal eye was closed.

The third case was one of rotatory nystagmus in the right eye of a girl aged eighteen months. The right eye deviates slightly upward. It has a marked rotatory motion from upward and outward to downward and inward. The left eye fixes normally, but in unconcerned gaze exhibits a slight vertical nystagmus. This case was not followed or even thoroughly examined, so comments will be omitted.[1]

The fourth patient was a boy of ten with a diagonal nystagmus of the right eye, which was very marked in unconcerned gaze but scarcely perceptible in fixation. The nystagmus ceased when the gaze was directed to the left, but it increased when the gaze was directed to the right, and then had associated with it a slow nystagmus-like twitching of the left eye also. Leucoma adherens. Artificial coloboma of the iris upward. Ophthalmoscopic picture normal. In one position an associated movement of the healthy eye of questionable character.

The cases described show that unilateral nystagmus may appear in all the varieties assumed by bilateral nystagmus. Naturally one would think the cause of unilateral nystagmus to be local or unilateral, and, since in the cases previously reported the nystagmus did not resemble that found in bilateral cases, this view gained general acceptance. Its probability is shaken, however, by the cases described above.

The question now arises whether unilateral nystagmus is to be distinguished as to its nature and its cause from the bilateral form. In my opinion it is not.

The causes of nystagmus in general have been sought for

[1] Dr. Weber, of Darmstadt, related to me the account of a case of purely unilateral rotatory nystagmus which was noticed a few days after birth. The fundus was normal. Hyperopia, 1.5 D. In the course of three months the nystagmus diminished and disappeared.

in three places: the muscles, the peripheral nerves, and the nerve centres. The first two theories cannot hold good for the bilateral form, but some observers still accept them for the unilateral form. In fact, in the unilateral form the element of double-sidedness is absent, but not the essential typical sort of pendulum movement that one can hardly believe to be due to a peripheral cause when there is a regular alternating action of antagonistic groups of muscles as we saw in Cases 3 and 4. There are, however, cases of twitching unilateral nystagmus.[1] In these it is not improbable that the cause lies in the muscles. Excepting such cases, we cannot distinguish between unilateral and bilateral nystagmus either as respects the location of the cause or as respects the nature of the movement.

As soon as one accepts a central cause for both, the explanation of the unilateral form at once presents the greatest difficulties. These arise from the extraordinarily close relation which exists between all the motor centres of one eye with those of the other. Every excitation at whatever point must be communicated to the other eye; for according to Exner, Hitzig, and Prevost communicating tracts pass from all the centres, not only to those of the eye of the opposite side but also to those of the eye of the same side. This is true of excitations which arise directly in any motor centre as well as of such as occur reflexly. That a unilateral reflex result of such an excitation may lead to a unilateral nystagmus is less probable than that such an effect could follow direct excitation, since Beaunis found that excitation of the corpora quadrigemina on one side might be followed by nystagmus of the opposite eye, but every nystagmus produced reflexly was bilateral.

There is, however, one fact noted in three of my cases and in many of those observed by others, which to my mind enables us to view unilateral nystagmus in a light

[1] I have recently observed such a case in a weakly boy with anisometropia. R, with -0.5 c $V = \frac{5}{5}$; L, with $+5$. D, $V = \frac{5}{15}$; slight divergent strabismus. When he converges or looks to the left the right eye performs rhythmic twitching movements; it is drawn inward quickly and then slowly turns outward. The left eye shows nothing of the sort either in convergence or in looking to the right, nor can any oscillation be discovered when the fundus is examined with the ophthalmoscope.

which reconciles all the contradictions described above. This is the temporary transference of the nystagmus from one eye to the other. This seems to me to indicate that we should regard unilateral nystagmus in general as nothing but a modified bilateral nystagmus. If we accept this view all the symptoms can be readily explained, even the transference from one eye to the other, which the fact of the close connection of the centres would lead us to expect. One thing must be granted, namely, a hindering or interruption of conduction that renders this transference from one eye to the other impossible, or possible at certain times only.

The location of this interruption I would seek exactly in the median line, for only there or near there could an interruption of conduction involve all the association systems arising from the nuclei for the ocular muscles. Our knowledge of the direct and association tracts is not yet complete enough to allow us to decide whether an interruption at any other point would have the same effect. The cases of traumatic unilateral nystagmus are perhaps to be interpreted as due to a hemorrhage between the nuclei or to an inflammatory hydrocephalus of the aqueduct of Sylvius. It would be a highly interesting and happy chance if this idea could once be verified by an autopsy.

My thanks are due to Dr. Samelsohn for his permission to use these cases and for his interest in the work.

After this paper was concluded Crzellitzer published the report of a case of bilateral nystagmus cured by discission of a lamellar cataract in each eye. The case is of interest because the nystagmus was relieved by removing the impediment to vision and slightly increasing visual acuteness. So far as I know, this is a unique case. In the other cases in which there was recovery, this was brought about by correcting an abnormal position of the eyes.

A few words may be allowed me on the nature of nystagmus. Crzellitzer supports Graefe's idea as to the origin of nystagmus, and opposes Raehlmann's theory. In this I cannot agree with him, for I believe it is necessary to

accept Raehlmann's idea of a pathological change in the centres, and even Graefe accepts such a basis for "optical nystagmus," although he regards it as secondary and of less importance than the weakness of vision. With this conception, which, however, Graefe expressed with all reserve, it remains unexplained why nystagmus does not always occur when there is poor vision; for here the subnormal excitation of the optico-sensory centres and the subnormal excitation proceeding thence to the optico-motor centres always exists. I believe, therefore, that it is at least necessary to suppose a particular disposition of the motor centres. Nevertheless, the acuteness of vision seems to me to have a certain causal relation to nystagmus. *Good vision is a corrective to the results of the central disease which causes nystagmus. When vision is poor this corrective is wanting.*

A CONTRIBUTION TO OPHTHALMOPLEGIA INTERNA, WITH SPECIAL REFERENCE TO REFLEX IRIDOPLEGIA.

By Dr. GEORGE LEVINSOHN, Berlin.

Translated by Dr. Ward A. Holden.

THE newer clinical and anatomical investigations (Uhthoff, Bach, and others) make it appear doubtful whether the more or less advanced affections of single muscles or of particular groups of muscles, which formerly were regarded as being of nuclear origin, are always due to disease of the nucleus; still there are, on the other hand, varieties of paralysis of the ocular muscles which clinically to-day can be explained only by a nuclear lesion. Of this sort is particularly the affection of the interior musculature of the eye which long remains isolated, namely, ophthalmoplegia interna. This affection is found not infrequently as a precursor or consequence of tabes, paralysis, and cerebral syphilis. It comes on, those cases apart which are due to diphtheria, ptomaines, and other disturbances producing acute symptoms, almost exclusively in old age, and has scarcely been observed in early youth.

The case now to be described is of interest, first, because it occurred in a young person, and, second, because no cause could be found for the ophthalmoplegia interna.

J. S., an errand-boy of sixteen, came to me complaining that for six days the sight of the left eye had been poor. His father was found to be suffering with advanced tabes, which had led to complete optic-nerve atrophy. Some months later he died. Two children had died in infancy, but the patient, the only remaining

child, is a healthy, strong boy, who has never been seriously ill, and is positive that the symptoms in the left eye are of only a week's duration. The examination of his nervous system was negative, except for a slight weakening of the left patellar reflex. The fact that he replied to questions that he was often tired and sleepy is of no great importance, when it is remembered that he was walking about the streets from early morning until night. The condition of the eyes was as follows:

R, myosis; L, mydriasis.

R, light reaction somewhat sluggish; L, light reaction very sluggish.

R, convergence reaction normal; L, convergence reaction very sluggish.

R V = $\frac{1}{1}$, with + 1.5 $\frac{1}{1}$; L V = $\frac{4}{10}$, with + 3.5 $\frac{1}{1}$.

R, Schw. 0.3 : 12 *cm* p. p.; L, with + 6. Schw. 0.3 : 30 *cm* p. p.

Instillations of eserine caused prompt myosis and a myopic refraction in both eyes.

Fundus of both eyes normal.

There was, therefore, an isolated, almost complete paralysis of the left interior musculature. Furthermore, the light reaction of the right eye is somewhat reduced. That the light reaction in the right eye is diminished is not due to a narrowing of the right pupil in consequence of dilatation of the left, as is shown by the fact that the right pupil dilates only very slowly when the left eye is covered.

At first the patient received iodide of potassium in small doses without any improvement. On the contrary, the reaction of the left pupil to light and convergence disappeared almost completely. Inunction treatment was then added and the reaction of the left eye increased. After the patient had taken 70 gr. of iodide of potassium and had used 100 gr. of mercurial ointment, and then had left off treatment, six months later the condition was:

R pupil = 3 *mm*, light reaction somewhat sluggish, reaction in convergence normal.

L pupil = 7 *mm* (mydriasis somewhat less), light reaction still sluggish, but perceptible and more pronounced than before; reaction in convergence well marked. Accommodation unchanged.

The significance of this case will be spoken of later, and another case will be described.

Miss H., aged nineteen, had noticed for four weeks a dilatation of the left pupil; scintillation in this eye had been noticed for some time. A careful examination of the patient, and particularly of her nervous system, revealed nothing pathological. There were no indications of acquired or hereditary syphilis.

The condition of the eyes was as follows:

Anisocoria L > R.

R, light and convergence reaction normal.

L, light reaction = 0.

L, convergence reaction reduced.

R = 5 *mm*; L = 7.5 *mm*
R (acc.) = 2.5; L (acc.) = 4.5 } in diffuse daylight

R = 6 *mm*; L = 7 *mm*
R (acc.) = 3.5; L (acc.) = 4.5 } in reduced illumination.

A drop of 4 % cocaine solution was instilled into both eyes, and after twenty-five minutes:

R = 6.5 (acc. 4), L = 9 (acc. 7), in daylight.

R = 8.5 (acc. 6), L = 9 (acc. 7), in reduced illumination.

A drop of 1 % eserine solution was instilled, and after fifteen minutes:

R = 1.5; L = 3.5.

Both pupils contract but slightly in accommodation.

After forty-five minutes both = 1.5.

R V = $\frac{1}{4}$, Schw. 0.3 : 11 *cm*; L V = $\frac{1}{4}$, with + 1.5 $\frac{1}{4}$, Schw. 0.3 : 18 *cm* p. p.

Iodide of potassium was given without improving the condition.

Four months later:

R, light and accommodation reaction normal.

L, light reaction very slight.

L, convergence reaction moderately reduced.

R V = $\frac{1}{4}$ +; Schw. 0.3 : 12 *cm* p. p. L V = $\frac{1}{4}$, with + 1.5 $\frac{1}{4}$, with + 2.25 Schw. 0.3 : 20 *cm* p.p.

We have here a disturbance of the intrinsic musculature of the left eye. This is not so extensive, however, as in the first case. There is only a unilateral reflex iridoplegia; the reaction of the left pupil in convergence and accommodation is present and only reduced. It may be mentioned here that this reduction is noticeable not so much from the fact that the contraction is insufficient as from the fact that the movement of the iris is very slow.

It may be noted also that the reaction of the pupil in accommodation and in convergence was tested at the same time. The accommodation was slightly paretic at first, and markedly so four months later.

The patient was subjected to treatment by mercurial inunction, and this was followed by iodide of potassium later. After some months she returned with the statement that her condition had not improved. Examination showed the following:

R = 5 *mm* L = 6.5 *mm* } dark day.
R, light reaction = 4 *mm*; L, light reaction = 6.5 }

R, accom. reaction 2.5 *mm*; L, accom. reaction 4.5, the horizontal diameter being somewhat greater.

With reduced illumination, both pupils about 6.5 *mm* R, light reaction 4; L, light reaction 6.5.

It is to be noted that with the loupe a very sluggish reaction to light can be seen in the left pupil, particularly below, and that the accommodative contraction of the right pupil is more prompt and is greater than that due to the influence of light.

R, light reaction = 4 *mm*; convergence reaction = 2.5 *mm*.

R V = $\frac{4}{4}$; L V = $\frac{4}{4}$, with + 1.25 $\frac{4}{4}$, + 2.25 Schw. 0.3 : 20 *cm* p. p.

The condition had now changed, in that the accommodation of the left eye had become further reduced. Furthermore, there is now a certain decrease in light reaction in the left eye.

In both cases we had to do with a more or less pronounced unilateral paralysis of the intrinsic ocular muscles. In Case 1 the paralysis was almost complete and involved equally the sphincter iridis and the ciliary muscle, to which was added at first a slight decrease of light reaction in the other eye.

In Case 2 there was at first only a unilateral reflex iridoplegia, with slight reduction of the reaction in accommodation and convergence. Later the reaction of the left eye to light returned somewhat, while the pupil became narrower and the accommodation decreased. Whether the light reaction of the right eye suffered in the beginning cannot be told, since there is no note in regard to the size of the pupil under exposure to light as compared with its accommodative contraction. Later, however, the light reaction of the right eye diminished somewhat.

In both cases the fundus is normal and the mobility of the eye perfect.

Both were in young persons with no symptoms of cerebral or spinal disease, and there were no etiological factors discoverable. Nor did treatment throw any light upon the nature of the affections, since such slight changes as occurred while the patients were under observation have been known to occur even when there has been no treatment instituted.

Cases like these just described are seen but rarely. Uhthoff[1] from among a large number of patients collected 30 cases of ophthalmoplegia interna, in 12 of which no etiological factors could be discovered. All of these cases had in common a relatively youthful age (20–30) and a neuropathic disposition (occasional headache, depression, excitability, convulsions). The disturbance of vision in most cases soon disappeared; in one healthy man of twenty-eight the paralysis of accommodation and of the sphincter in one eye lasted only one day, and in other cases a few days only.

Our patients do not exactly fit into this category, since they were younger and had no signs of a neuropathic disposition, and the affection was of long duration. However, Uhthoff cites one case, that of a woman of forty-two, who had had internal ophthalmoplegia with mydriasis in both eyes since her twentieth year, but showed no evidences of any pathological conditions of the nervous system. Uhthoff believed that in the cases of ophthalmoplegia interna in which etiological factors could not be discovered, some noxious agent, which affected by preference the nuclei for the intrinsic muscles, such as ptomaines from meat and the like, was at the bottom of the trouble.

Two cases may be mentioned in which such an etiology is not unlikely.

H. F., aged twenty-seven, contracted syphilis seven years before and was treated with inunctions. Five days ago he noticed a flickering before the right eye. Examination: A healthy man. R, moderate mydriasis with diminished reaction. Accommoda-

[1] "Zur diagnostischen Bedeutung der reflectorischen Pupillenstarre." *Berl. klin. Wochenschr.*, 86, 1 and 2.

tion normal. V = $\frac{6}{6}$ in each eye. Left eye normal. Two days later the accommodation in the right eye was found to be reduced. When seen some time later the patient stated that the disturbances in the right eye had vanished completely in the course of a few days.

This case seems more like those of Uhthoff's. Another was as follows:

A strong man of thirty complained that he had not seen well near by for a day. Excepting thirst and vertigo there were no other symptoms. Four days before he had eaten Kiel sprats, and three days later, his vision having become somewhat affected, he ate them again. His wife, who also ate the sprats, complained of poor vision, vertigo, numbness of the limbs, and thirst, all of slight degree, but she had also diarrhœa and deafness of one ear. The examination of the man gave the following:

R pupil dilated almost ad maximum, L less dilated.

Both pupils react to light and in convergence, but contract only a little less than medium wide.

With + 2.5 V = $\frac{6}{6}$ each.

R with + 4.5 Schw. 0.3 : 30 *cm* p. p.

L with + 5.5 Schw. 0.3 : 30 *cm* p. p.

The patient received a 1 per cent. morphine solution, of which he took 15 drops three times daily. The following day the pupils were much smaller.

R and L V = $\frac{6}{9}$; with + 1.5 Schw. 0.3 : 25 *cm*.

Still some thirst and dulness, which disappeared two days later. The woman, who presented herself two days later than the man, had no symptoms remaining except the diarrhœa. Pupils and accommodation normal.

This was a typical example of fish poisoning which affected accommodation and sphincter muscle equally.

The question now arises, Where are we to locate the disturbance which caused the symptoms in our first two cases? We mentioned above that an ophthalmoplegia interna remaining localized for a long time almost always is of nuclear origin. The proof of this is not hard to adduce. Since the intrinsic musculature possesses a sympathetic end neuron lying in the ciliary ganglion, we are able to discover whether a defect in the intrinsic musculature is due to a lesion

peripheral to or central from the ciliary ganglion.[1] We saw in our case that the instillation of a 1 per cent. solution of eserine reduced the pupils to a minimum size and restored the paralyzed accommodation. The damage, therefore, must have been central from the ciliary ganglion. Thus the view recently defended by Marina that in pupillary disturbances the ciliary ganglion particularly was to be taken into account, was out of the question in our case. It were difficult if not impossible to explain the unequal paresis of accommodation and of the sphincter as well as the unequal reaction of the pupil to light and in convergence to an affection of the ciliary ganglion. It was equally unlikely that the trunk of the third nerve had been affected, otherwise other muscles would have been involved. The same holds good for the fascicular fibres between the oculomotor nucleus and the base of the cranium.

Nothing remains, therefore, but the oculomotor nucleus, and a nuclear affection would explain the clinical difficulties in a satisfactory manner. It is now fairly well determined from numerous physiological, anatomical, and pathological studies that the small-celled Edinger-Westphal median nucleus corresponds to the sphincter iridis, while the unpaired large-celled median nucleus governs the ciliary muscle. It is therefore probable that in our first case there was an affection of this nucleus.

In our second case the matter is not so clear. Here, besides a slight weakness of accommodation, we have a pupil responsive in convergence but not to light; that is, a unilateral reflex iridoplegia, which deserves more discussion.

Unfortunately no pathological studies have thrown any light upon this condition which, according to our experience, is by no means so rare as the reports in the literature would indicate, and we are not yet past the stage of theoretical discussions in regard to it.

The course of the pupillary fibres to the oculomotor nucleus is now, thanks to the labors of Bernheimer,[2] fairly well understood. Bernheimer has shown also that the two

[1] Paul Schulz, "Ueber die Winkungsweise der Mydriatica und Myotica." *Archiv f. Anat. u. Physiol.*, 1898.

[2] "Die Reflexbahn der Pupillarreaction," *Arch. f. Ophth.*, xlvii.

sphincter nuclei are in connection both through an incomplete crossing of the pupillary fibres and through a directly connecting tract. This latter fact overthrows all the theories, including that of Moebius, which seek to explain unilateral reflex iridoplegia through an injury of the centripetal reflex branches. For under these conditions the slightest and the most excessive excitations that affect a pupil would always cause a similar reaction in the two pupils, and unilateral reflex iridoplegia would be impossible.

Likewise we must reject the assumption of Heddeaus[1] that the nerve supplying the sphincter arises from two nuclei — the sphincter and the accommodation nucleus, and that both the fibres of the accommodation nucleus and those of the sphincter nucleus end in the ciliary ganglion, and therefore each has an influence only in its particular function. Furthermore, according to Heddaeus's assumption the pupil with reflex iridoplegia must always be the wider, and a suppositious simultaneous excitation of the accommodation nucleus to explain a narrow pupil must be objectively demonstrable, which is not the case.

Since we agree with Heddaeus that unilateral reflex iridoplegia can depend only upon a lesion of the point of departure of the centrifugal reflex branch, in order to explain this peculiar symptom we must seek in the sphincter nucleus itself the reflex centre that transforms the excitation caused by light into a contraction of the sphincter, and further assume that besides these reflex cells still other cells exist in the sphincter nucleus which permit a contraction of the sphincter. We divide the sphincter nucleus, to a certain extent, into two parts. This allows us to explain satisfactorily many things that were not clear. If, for the sake of simplicity, we call S L those cells in the sphincter nucleus which transform the excitation into a movement of the sphincter, and the other sphincter cells S C, it is clear that an affection of S L would cause only unilateral reflex iridoplegia. We understand, too, that in unilateral reflex iridoplegia the pupil of the affected side is usually the larger, because the excitation of light causing sphincter tonus is

[1] "Ueber eins. refl. Pupillenstarre," *Archiv f. Augenheilk.*, 1893.

wanting on the affected side. If, besides the exclusion of S L, there exists an irritation of S C we would have an arrow pupil unresponsive to light.

It must be remembered that the oculomotor fibres proceeding from the sphincter nucleus are not to be regarded as motor fibres, since they neither physiologically produce a voluntary movement nor anatomically supply a muscle. Since the neurons for the terminations of the nerve supplying the sphincter lie not in the nucleus but in the ciliary ganglion, the Edinger-Westphal nuclei are in a measure only reflex centres which transmit the excitation caused by light or the excitation caused by accommodation and convergence to another nerve tract.

This view brings us nearer to an understanding of the nature of reflex ophthalmoplegia in general.

The peculiar signs of the Argyll-Robertson phenomenon led to the term spinal miosis, and the lesion was supposed to lie in the cord. Now, however, the condition of the pupil in reflex iridoplegia and miosis proves that in many cases there is no involvement of the cervical sympathetic, apart from the fact that paralysis of the sympathetic would cause other symptoms also.

The view of them that regard the reflex centre for pupillary contraction as lying in the upper part of the cervical cord lacks at the present time any foundation whatsoever.

If we conceive the sphincter nucleus to consist of two divisions, the explanation of bilateral reflex iridoplegia offers as little difficulty as that of unilateral. That a sphincter affection is the cause of reflex iridoplegia is indicated, furthermore, by the frequent inequality and irregularity of the pupils in this condition, and by the fact that the intensity of the light reaction often differs on the two sides, being slight on one side and wanting on the other. Because of the central connection of the sphincter nuclei every excitation that affects one nucleus affects the other in like manner; and if the reflex iridoplegia was due to a lesion elsewhere than at the point of departure of the centrifugal reflex tract (provided the cervical sympathetic was intact) there would necessarily be pupils of equal size and corresponding reaction.

This makes it impossible to suppose a lesion to exist in the ascending reflex branch. Such a lesion could diminish the reflex sensibility or even annul it altogether; it could furthermore, through irritation of the adjacent sphincter nucleus or with beginning spontaneous disease of the latter, lead to iridoplegia with miosis, but under these circumstances both pupils would always remain of the same size.

While the difference in form and light reaction of the pupils necessitates our locating the disease in the centrifugal reflex tract, this is the more true when, besides the inequality, there is a more or less absolute iridoplegia. It is not so rare that a reflex iridoplegia passes over into an absolute iridoplegia, a further reason for locating the cause of the reflex iridoplegia in the sphincter nucleus. The same is true of those cases in which, contrariwise, with improvement in the disease, an absolute iridoplegia gives place to a reflex one.

The form and reaction of the pupils will vary according to the severity of the affection of the individual nuclei. An interesting example is as follows:

Mrs. X., aged forty-nine, suffers from well-marked tabes. Uncertainty in walking. Westphal's and Romberg's symptoms, weakness of the legs, urinary disturbances, and girdle feeling. Probably syphilis. One child died early of convulsions.

R V = $\frac{5}{12}$ with + 1.25. With + 2.25 Schw. 0.5 : 30 *cm* p. p.

L V = $\frac{5}{10}$, not improved. With + 2. Schw. 0.5 : 30 *cm* p. p.

Cataracta incipiens in both eyes. R pupil = 3.5, L = 4.5 *mm*.

L, light reaction = 0. Convergence reaction sluggish to 2.5 *mm*.

R, with a loupe a trace of light reaction. Convergence reaction 2.5 *mm*.

We have here an almost complete reflex iridoplegia, right, and only a trace of light reaction, left, besides a slight paresis of accommodation, left, and a diminution of convergence reaction more marked in the left eye.

The existence of light reaction in the left eye is manifested in diminished illumination. Here the right pupil dilates to 4 or 4.5 *mm*, while the left maintains its constant diameter, 4.5. The diminution of accommodation in the

left eye is shown by the fact that Schw. 0.5 : 30 *cm* is read with + 1. added to the right eye, and with the left only when +2. is added.

That the dilatation of the left pupil is not the result of irritation of the sympathetic is shown by the effect of cocaine. Under cocaine:

R = 5, L = 7, in the light;

R = 6.5, L = 7, in the dark.

Cocaine thus acts on both dilatators equally; the right pupil remains always somewhat narrower because there is still a faint reaction to light. If there were an irritation of the left sympathetic, then the left pupil would have become wider than the right after the use of cocaine.

Eserine contracts both pupils to 2 *mm*. Atropine dilates them to 8. We must therefore exclude a lesion in the ciliary ganglion as well as a participation on the part of the sympathetic.

There is no doubt but that such disturbances do occur. We know that in ophthalmoplegia interna paralysis of the dilatator is not uncommon, and also an affection of the ciliary ganglion might with accurate observation often be diagnosed with the assistance of pupillary reagents. The latter are of great value in diagnosing pupillary symptoms, and the importance of Schulz's investigations should not be overlooked. In how far affections of the ciliary ganglion may be primary or secondary is uncertain. An affection localized to the pupillary fibres will, if not well marked, hardly be diagnosed, since it would cause only a moderate decrease in light reaction without inequality of the pupils. This can arise only through an affection of the centrifugal reflex tract. The following case is an example of the simultaneous occurrence of nuclear disease and sympathetic paralysis:

B. K., aged forty-one, had a chancre twenty-three years ago, without secondary symptoms. Weak patellar reflexes, particularly the left. Incontinence of urine, analgesia of the legs, delayed sensibility. Pupils of somewhat irregular form. R = 3.5 *mm*, L = 4.5 *mm*. R, light reaction = 0; L, light reaction barely detectable with the loupe. Convergence reaction diminished on both sides. R = 3 *mm*, L = 3.5 *mm*.

On instilling cocaine the pupils remained of fairly constant size and the enlargement was scarcely perceptible. The reaction to light remained as before. Eserine contracted both pupils to 2.25 *mm*, but in accommodation they contracted down to 1.5 *mm*.

Atropine caused a slow dilatation, the right pupil dilating first in the vertical diameter and then in the horizontal. Forty-five minutes after 1 per cent. atropine had been instilled several times into the right eye the right pupil had a vertical diameter of 7 *mm* and a horizontal of 6.5 *mm*, while the pupil of the left eye, to which nothing had been done, had become more regular and had contracted slightly. In the course of fifty minutes the left pupil, after several instillations of 1 per cent. homatropine, dilated to 7 *mm*.

This was apparently a case of beginning tabes, but the pupillary symptoms could not be explained by a nuclear affection alone. The fact that the pupil did not dilate with cocaine indicated a disturbance of the cervical sympathetic supplying the dilatator. This disturbance caused the slow dilatation of the pupil when atropine was used, since traction on the part of the dilatator was wanting. It cannot be determined whether the dilatation of the left pupil depended upon a remaining portion of left dilatator tonus or on a more marked right sphincter tonus.

Contrary to the preceding case, in which the narrow pupil still showed a slight reaction to light, the dilated pupil in the last case preserved a slight reaction to light.

REPORT OF THE SECTION IN OPHTHALMOLOGY OF THE NEW YORK ACADEMY OF MEDICINE, DECEMBER 17, 1900.

By Dr. J. H. CLAIBORNE, Secretary.

DR. CALLAN, PRESIDING.

Dr. W. H. Bates presented a case of **removal of the lens for myopia.** He obtained vision $\frac{20}{40}$ without an astigmatic glass, whereas before there had been a high degree of compound myopic astigmatism. There had been central choroiditis in the eye extending over a period of three years. Five operations had been performed. Dr. Bates called attention to the general treatment which he had given this patient, and attributed much of his success to it. He had the patient drink three quarts of water daily, and considered this a very interesting matter ; he desired to have the members of the Section interested in this form of treatment. He also exhibited a case in which a foreign body (piece of steel) in the anterior chamber passed through the cornea and into the iris without injuring the lens.

In the discussion, Dr. E. Gruening said that Dr. Bates's result was very satisfactory, but he did not think it was due to the water which the patient had drunk, but rather to the successive operations which had been performed. He thought it regrettable that the brilliant result should be wrongly attributed to the water. In reply, Dr. Bates said that for five years he had studied secondary cataract, and had come to the conclusion that changes in the capsule of the lens were due to the formation and deposit of fibrin, not to thickening of the capsule, and referred to his paper on that subject. He had been accustomed to give intravenous injections of water to rabbits, and had observed that it lessened the formation of fibrin in the blood. He believed the ingestion of water by the human being under these circumstances

would tend to diminish the tendency to secondary cataract, and he believed his good result in this case was largely due to the ingestion of water.

Dr. ARNOLD KNAPP showed a case of **exophthalmos** in a man, forty-nine years of age, who had received a blow over the left brow about six weeks before the eye began to protrude. The picture was that of extreme venous stasis of the eyelids, conjunctiva, and retina. No bruit had been detected. A diagnosis was asked for.

Dr. WEEKS, Dr. HOLDEN, and others discovered on auscultation a distinct bruit, synchronous with the heart-beat The bruit could only be heard over a small area in the region of the external lateral ligament. The diagnosis of an arterio-venous aneurysm was thus assured.

Dr. TYSON showed a case in which there was a slight **growth on the upper portion of the cornea in each eye.** He had touched one eye with the actual cautery and had obtained a cure. A section was made from the growth on the right eye, and it was found to contain fibrous tissue. In the left eye the growth had practically disappeared under the use of the cautery.

Dr. TANSLEY showed a case in which **grains of powder from an explosion had passed through the cornea into the background of the eye.** One grain was in the vitreous humor, while the other was in the vicinity of the optic disc and could be readily seen with the ophthalmoscope.

Dr. J. M. MILLS presented a case of **tumor of the upper lid,** and showed specimens under the microscope. He had seen the patient six weeks ago. The woman had noticed the appearance of the nodule upon the upper lid six months previous; it was continually increasing in size. When the patient was exhibited, the entire upper lid was hard and brawny and thickened to the extent of $\frac{1}{4}$–$\frac{1}{2}$ inch. The lid could not be turned and the cornea could be seen with difficulty. Enough of the under surface of the lid could be seen to show that it was extremely rough. The cornea was covered with blood-vessels.

Dr. H. KNAPP showed a case of **adenoma of the Meibomian glands,** with microscopic demonstration, and made some remarks. He had seen Dr. Mills's case, and had made the diagnosis without the use of the microscope; he had seen one other case. In his patient, on the inner surface of the upper lid could be seen traces of the Meibomian glands. The microscope proved

the correctness of the diagnosis. The piece which was cut out filled up once more. He was unable to remove all of the tumor in his case; a considerable portion was removed, however, and there remained over the upper lid only a thin skin. Dr. Knapp said that his case and Dr. Mills's were the same disease, that there were only five cases on record, and referred to the literature on the subject, particularly the paper by Salzmann (these ARCHIVES, vol. xx, 3, p. 380). These tumors have small nodules in them, are yellowish in color, and are hard in some parts, soft in others. The tumor in this case was situated between the skin and tarsus. It is well to look for these tumors and remove them at the very beginning.

Dr. POOLEY showed a case of **herpes zoster ophthalmicus** on the left side; the vesicles had become confluent. There was very little inflammation of the eye. He remarked that unless the nasal twig is involved the eye is not as a rule affected.

Dr. CLAIBORNE reported a case of **acute exophthalmos with neuro-retinitis apoplectica** in a negro man who had contracted syphilis thirty years before, and taken medicine for one year. About six weeks previously the eye began to be troublesome. Dropping of the lid of the right eye was developed with great pain over the brow and sensation of pressure. The eyeball was very prominent, lid drooped completely, there was complete ophthalmoplegia, and some anæsthesia of the cornea. There was choked disc, profuse and numerous hemorrhages from the region surrounding the optic disc and macula lutea. He diagnosed a gumma of the orbit, probably at the apex, and put the patient under treatment with iodide of potash, gradually increasing doses, with the result of immediate subsidence of the pain and diminution of all the signs and symptoms.

Dr. HOLDEN said he had seen a similar case in which autopsy had disclosed a gumma within the muscle funnel.

Dr. KNAPP showed a case in which **a bit of steel had been removed from the interior of the eye.** The steel had passed through the edge of the cornea; the lens and iris were uninjured. The retina was lacerated near the disc but no foreign body could be seen; as there had been a clear history of the entrance of the foreign body it was assumed that it had been repelled by the sclera and had dropped to the bottom of the eye. He dilated the pupil and put Haab's magnet before the eye. When the magnet was below the patient felt some discomfort and finally on

raising the magnet he was able to draw a speck behind the periphery of the iris. He tried to tease it into the pupil but failed; he only succeeded in bringing the object into view. He made a section of the cornea and applied the magnet; the foreign body was drawn through the iris and finally caught on the magnet and removed. The case made an uneventful recovery, with good sight and good field of vision.

Dr. KNAPP said if the length of the piece of steel had been known to him he would not have attempted to extract in the manner he had used but would have made an incision in the sclera and removed it through that aperture. The foreign body was too long to make the turn through the pupil. He advised the use of the X-ray in determining the size of foreign bodies in the interior of the eye.

Dr. JOHNSON showed a case of **posterior capsular opacity of the lens.**

Dr. ARNOLD KNAPP read the paper of the evening, entitled **"Operative Treatment of Trichiasis, with Demonstration of Cases."**

The method of operating should depend on the nature of the deformity present, *i. e.*, whether the tarsus is curved or not. In the latter case the row of eyelashes only has to be displaced, which can well be done by a sliding flap operation, or combination of the Jaesche-Arlt and Hotz methods. In the former variety, where the tarsus is grooved, the eyelashes must be displaced and the curving of the tarsus corrected. This can be done most satisfactorily by the complete section of the tarsus or the Panas operation.

A number of patients illustrating the Panas method were exhibited.

Discussion.—Dr. JOHNSON said that he thought the proceedings as described by Dr. Knapp were excellent and had been attended with good results, but that each man had his own way of doing things and was likely to think that way the best.

Dr. WEEKS said he thought it well to separate the margins of the lid and transplant a wedge of skin; he further remarked that the reconstruction of the edges of the lid, combined with Dr. Knapp's suggestion, was very good.

Dr. GRUENING referred to shoving the lower flap very far upward and slitting the flap in such a way as to use a suture on the tarso-orbital aponeurosis. He made reference to the value of

Hotz's operation but said that Dr. Knapp's method was quite as good. He said he no longer cut the tarsus.

Dr. CALLAN referred to the results in cases in which trachoma still existed and outlined the value of canthotomy as a preliminary procedure to operation on the lid.

In conclusion Dr. KNAPP stated that he had found a preliminary canthotomy only necessary in trichiasis of the lower lid and felt convinced that without it no lasting effect could be obtained by any operation on the lower lid.

REPORT OF THE OPHTHALMOLOGICAL SECTION OF THE SEVENTY-SECOND MEETING OF THE SOCIETY OF GERMAN NATURALISTS AND PHYSICIANS AT AIX, SEPTEMBER 16–22, 1900.

By Dr. HERMANN VIELLERS (Aix).

Translated by Dr. Ward A. Holden.

FIRST SESSION, SEPT. 18TH, PROF. AXENFELD PRESIDING.

Bertram (Düsseldorf): **On complete ophthalmoplegia.** With presentation of a patient.

This patient came under observation twelve years before, at the age of twenty-nine, complaining of diplopia. There was then complete paralysis of the extrinsic muscles of the left eye supplied by the third nerve and an almost complete paralysis of the sphincter and ciliary muscle. Syphilis had been acquired eight years before. Antisyphilitic treatment led to undoubted improvement. Six months later the process had extended to the right eye, so that besides a complete oculomotor paralysis of the left eye there was paralysis of the external rectus and intrinsic muscles of the right. Inunction treatment was of little service.

Five years later all the muscles of the left eye had become paralyzed, and of those supplying the right eye, only the levator and rectus superior and inferior remained unaffected. The patient now complained of pain in the temples and a diminution of vision in the left eye. Iodide of potassium was taken without effect.

At present all the muscles of the left eye are paralyzed. The pupil is moderately dilated and unresponsive. $V = \frac{1}{20}$. Visual field contracted. No ophthalmoscopic evidences of atrophy of the optic nerve.

The right eye can be moved slightly up and down and the lid can be raised. The pupil large and unresponsive. With + 1, V = ½.

The patellar reflex is now wanting on the right side and the left facial nerve is beginning to be paretic. The tongue and the fingers tremble. Pulse 130–140. Heart sounds normal.

The author believes that in this case he had to do with a nuclear process, caused by syphilis, and progressive. The extension of the process was not steady, but interrupted, which the author holds to be characteristic of brain syphilis, and the successive involvement of various muscles supplied by the oculomotor nerve suggests a nuclear lesion. The late symptoms, such as the loss of the right patellar reflex, the weakness of the left facial, and the tremor of the tongue and hands may be referred to the patient's excessive use of alcohol or to a beginning tabes.

THIER (Aix) had observed several cases of complete ophthalmoplegia due to syphilis. In one case the affection continued for seven years without any changes in the optic nerve or diminution of vision. Then suddenly the field became contracted and atrophy of the nerve was soon apparent. The final outcome in this, as in almost all cases, was complete blindness.

VIELLERS (Aix) : **An unusual case of keratoplasty.**

Viellers describes a case in which conjunctiva was transplanted on to the cornea for the purpose of curing an ulcer, but the desired result was not obtained and the eye was lost. The author believes that in carrying out these operations the division of a portion of the marginal vascular network, through which the cornea is nourished, may affect the nutrition of the eye and its resistance so that, as in this case, the flap does not adhere. If other similar bad results are reported the author believes that the indication for operation, "delayed tendency to heal in an ulcer," must be given up.

THIER (Aix) : **Erysipelas and the eye.**

The author speaks of a hitherto undescribed effect of erysipelas upon the diseased eye. He observed two obstinate cases of scrofulous keratitis which for a month were resistant to treatment and then suddenly were cured by the onset of erysipelas.

An interesting case of alternation between erysipelas and ocular disease was the following : A manufacturer of forty suffered from severe erysipelas of the face. While he lay in bed with a high fever on a cold winter night a fire broke out in his shop

and he rushed out insufficiently clad, and helped to put it out. The following morning the erysipelas had disappeared but the patient's vision was very poor. Examination two weeks later revealed the picture of retrobulbar neuritis, which lasted six months. In conclusion the author cited a case in which an apparently harmless conjunctivitis was followed by erysipelas of the lids and region about the eyes, which through direct infection without the mediation of orbital cellulitis led to purulent cyclitis and loss of the eye. Three years later the same clinical picture appeared in the other eye. Numerous incisions of the skin, carbolic-acid compresses, and finally subconjunctival injections of bichloride saved the eye.

RANSOHOFF (Frankfort) confirmed the favorable action of erysipelas on a case of granular conjunctivitis, which remained cured.

AXENFELD had seen erysipelas have a favorable effect upon trachoma and particularly upon the pannus, yet the improvement was only transient and a relapse followed.

TREUTLER (Aix): **Demonstration of sterile vials for subconjunctival injections.**

Treutler exhibited sterilized sealed vials holding enough liquid to charge a hypodermic syringe, and filled with various solutions used for hypodermic and subconjunctival injection.

PETERS (Bonn): **Further contributions to the question of cataract formation due to tetany.**

Peters reports on further experiences in regard to the connection between cataract and tetany. After mentioning the paper by Freund and Wettendorfer, he reports a further microscopic examination of a case of nuclear cataract which showed the typical changes of lamellar cataract in the presence of globules and cavities at the periphery of the nucleus. Eighty cases of rachitis which he had examined failed to show lenticular changes a single time, though one would have expected to find such changes if lamellar cataract is indeed a symptom of rachitis. In ten cases of tetany, however, he found perinuclear or nuclear changes in four. This indicates that tetany rather than rachitis is the etiological factor. Since new statistics by Kirchgässer show that rachitis exists in 80 per cent. of the cases of tetany, which corresponds to the older statistics in regard to the relation of lamellar cataract and rachitis, the importance of tetany in the production of lamellar cataract can no longer be doubted.

AXENFELD: **Plastic reproduction of the entire conjunctival sac in a case of total cicatricial symblepharon and anchyloblepharon.**

Axenfeld mentioned some of the cases described in the literature and then passed to his own case—one of symblepharon and anchyloblepharon of such degree that the lashes of the upper and lower lids touched.

June 27, 1899.—First operation in narcosis. The lids were separated from the ball as far back as the equator. A small fold of scar tissue was left at the sclero-corneal margin to which the flaps could be sutured. Then a flap from the mucosa of the lower lid 2 *cm* long and 1.5 *cm* broad was laid above the sclero-corneal margin and sutured to the fold of scar tissue and to the superior rectus and the episcleral tissue in the region of the equator.

Then from the upper arm three Thiersch flaps 3 *cm* long and 1.25 *cm* broad were cut and attached side by side to the sclero-corneal margin and to the edge of the lid, being held down in the retrotarsal fold by a restraining suture passing the entire length of the fold. Two other Thiersch flaps were attached in the same way to the wound surface in the upper lid.

In two weeks it was found that the mucous flaps and the middle and nasal epidermis flaps had united. In the upper lid the tarsus was covered by epithelioma in its anterior half only.

Therefore July 17, 1899, a further operation was made. After everting the upper lid it was freshened back to the equator. From the upper lip a flap of mucosa 4 *cm* long and 1.5 *cm* broad was cut and divided and then the two flaps were sutured at their narrower ends to the mucosa of the ball and to the attached epidermis. As in the lower lid, these flaps were held in the cul-de-sac by a restraining suture.

Other similar operations were made and finally a sac 1.5 *cm* deep was obtained above and one 0.5 *cm* deep below. In attempting to insert an artificial eye it was found that the ball was too large, so a needle was passed into the ball and ½ *cc* of liquid was evacuated. After a violent reaction the ball became small and the artificial eye was inserted.

The author believes that it is not proper to cover both exposed surfaces with mucous membrane, since granulation tissue forces its way through and leads to adhesions and obliteration of the sac. He prefers Thiersch grafts or the use of mucous membrane on one surface and skin on the other.

AXENFELD and SCHÜRENBERG (Rostock): **On congenital disturbances of the ocular muscles and on unilateral spasm of accommodation.**

1. Complete congenital absence of abduction without secondary squint.

In one of those remarkable cases in which with complete absence of mobility outward there was binocular vision in the middle line and in the opposite field of fixation, the writers found at the autopsy that in place of the abducens muscle there was an elastic band which prevented a convergent squint but yet was flexible enough to allow free motion inward.

Passive movements of the eye had previously suggested the existence of such a condition.

2. A similar test of passive motion by traction on the eye with forceps would show in the cases of retraction movement of the eye whether the retraction occurring with lateral movement is due to an abnormal insertion of the lateral muscle far back (Bahr), or whether a fast fixation on the opposite side allows movement only when the fixing band is relaxed by the retraction (Türk). The authors found by passive movements that the latter possibility could be excluded and that in their case a particular retractor bulbi existed. Passive movements are recommended for future cases.

3. **Congenital cyclic oculomotor paralysis, *i. e.*, paralysis of the oculomotor alternating with rhythmic spasm of the levator, sphincter iridis, and ciliary muscle.**

Since the birth of the six-year-old patient there had existed a left complete paralysis interrupted every three to five minutes by the spasm mentioned above. This was quite analogous to the cases of Fuchs and Rampoldi, and the authors therefore consider this rare disturbance a typical clinical picture which on account of the alternation they call "cyclic."

SECOND SESSION, PROF. PETERS PRESIDING.

PFALZ (Düsseldorf): **On rheumatic sclero-keratitis with remarks on the action of salicylate of soda and aspirin.**

In 1894 the author had described the clinical picture to which he had given this name. He considers the effect of salicylate of soda on the disease as quite pathognomonic. There suddenly appears a circumscribed ciliary injection with sensitiveness to pressure, gradual extension through the entire periphery of the

cornea, and photophobia, lachrymation, etc. Later delicate deep-lying opacities appear transiently in the deep layers of the corneal margin. Recovery in three weeks, but when salicylate of soda is given, in three or four days. Often the affection recurs, becomes chronic, and is complicated with iritis. When salicylate of soda is not well borne, aspirin is given, which does not act so promptly.

In the discussion several others stated that they had seen the affection frequently and had cured it with salicylates.

VIELLERS (Aix): **Presentation of a patient.** A piece of steel in the eye, located with the sideroscope of Asmus and removed through the original corneal wound by means of the Haab magnet.

KÖHNE (Duisberg): **On a new symblepharon operation.**

Köhne's method is to separate the adhesions between the lid and ball not only to the retrotarsal fold but even to the orbital margin where the skin is divided. Two large Thiersch grafts are then placed together in position so that the ends pass out through the incision in the skin and through the palpebral aperture. The grafts are then sutured at the opening in the skin and the other end of the outer flap is turned over the margin of the lid and sutured. Two patients were exhibited on whom this operation had been done with good result.

KIRCH (Aix): **Presentation of a patient.** In spite of purulent cyclitis a splinter of iron had been removed from the vitreous with the Hirschberg magnet and the traumatic cataract extracted at the same time. The final result was favorable. $V = \frac{4}{10}$. Kirch spoke also of atrabilin. He uses 2.00 of atrabilin in 10.00 of boric-acid solution. This agent rapidly produces ischæmia of the conjunctiva, which lasts for a considerable time. It has proved to be of value in acute conjunctivitis with hyperæmia, swelling, and enlargement of the papillæ.

PFALZ: **Demonstration of a lens mounted on the finger for lateral illumination in minor operations on the cornea.**

STAAD (Barmen): **The artificial ripening of senile cataract in the unbroken capsule.**

In 430 cases in which he has operated for cataract the author had done Foerster's trituration 130 times. In 120 there was a prompt result. Purely nuclear cataracts (especially in patients over sixty-five) and lamellar cataracts did not react to the operation.

As regards the final results he concludes that the acuteness of

vision obtained by operating on both eyes after maturing one is greater than that obtained when only one spontaneously ripened cataract has been removed. Secondary cataract is twice as common in the matured cases as in the others. The following table is given.

	Artificial Maturation.	Spontaneous Ripening.
$v = 1$	8 %	4.5 %
$v = \frac{5}{6}$	34 %	19 %
$v = \frac{5}{8}$	19 %	29 %
$v = \frac{5}{10}$	18 %	31 %

REPORT OF THE OPHTHALMOLOGICAL SECTION OF THE 13TH INTERNATIONAL MEDICAL CONGRESS IN PARIS, AUGUST 2-9, 1900.

By Prof. E. BERGER, Paris.

(*Conclusion.*)

Translated by Dr. Ward A. Holden.

SESSION OF AUGUST 4TH.

Druault (Paris): **On the pathology of quinine amaurosis.**

Experiments on dogs showed that quinine amaurosis was due to the toxic action of the quinine upon the ganglion cells of the retina, which degenerate, rather than to the ischæmia caused by the spasm of the vessels. The preservation of the fibres supplying the centre of the retina could hardly be explained on the theory of vascular spasm.

Kopff (Paris): **A case of bilateral optic neuritis caused by influenza ending in recovery.**

The optic neuritis appeared on the sixth day of the disease with reduction of vision to the ability to count fingers, mydriasis, and papillo-retinitis. The treatment consisted in the use of leeches, quinine, calomel, and a milk diet. Four months later the vision of the right eye rose to $\frac{8}{10}$, and that of the left to $\frac{7}{10}$.

Santos Fernandez (Havana): **Amblyopia due to peripheral neuritis of the optic nerve resulting from intestinal auto-intoxication.**

In the late war Santos Fernandez saw a number of cases of central scotoma with fundus changes like those seen in tobacco amblyopia, without other evidences of the abuse of tobacco or alcohol. In all the patients there were digestive disturbances with severe, long-continued diarrhœa. Besides auto-intoxication

the great debilitation of the patients due to overexertion, worry, and the like, played a rôle.

DOR (Lyons): **Optic neuritis in infectious diseases and particularly mumps.**

Dor found optic neuritis in a series of cases of epidemic parotitis. This occurrence is not infrequent in military hospitals when there are epidemics of mumps. In general the prognosis is favorable, yet in exceptional cases atrophy of the nerve results. The treatment consists in the use of purgatives and diuretics.

SOURDILLE (Nantes): **On the pathological anatomy of toxic optic neuritis.**

Two cases were studied. In one, a toxic optic neuritis in consequence of streptococcus infection, he found an endovasculitis with obliteration of the lumen of the vessel and atrophy of the neuroglia and of the connective-tissue septa. In the second, an axial optic neuritis in an alcoholic woman suffering from tuberculosis and syphilis, the anatomical changes in the vessels were similar, but particularly well marked in the optic canal. According to Sourdille the toxic substances in the blood cause first a proliferation of the endothelium, then an affection of the connective tissue of the vessel wall, and finally a perivasculitis.

ROCHON-DUVIGNEAUD (Paris): **On the amblyopia occurring in the last stage of cancer.**

With the exception of a slight anæmia of the optic disc Rochon-Duvigneaud could find no anomalies in the fundus. Nor could he find in the retina, optic nerves, chiasm, or optic central organs, in a case that had been examined in life, anything abnormal. He would explain the amblyopia as being due to an excessive anæmia of the visual centres.

PARINAUD: **On the explanation of the pathology of toxic optic neuritis.**

Toxic substances affect the neuron in its entire course from the periphery to the centres. Why certain poisons affect the optic nerve and only its macular fibres is difficult to explain. Analogies of the selective action of a poison on particular portions of the nervous system are not rare: curare acts on the end plates of the motor nerves, the diphtheria toxin on the muscle of accommodation, etc. Parinaud regards toxic optic neuritis as a special form of disease of the central nervous system in consequence of the action of the poison. The optic nerve is genetically nothing but an extracranial portion of the brain substance. In every

toxic optic neuritis other portions of the central nervous system may be attacked later.

BLOCH (Ratibor) mentioned the importance of determining the peripheric limits of the visual field in toxic optic neuritis, particularly when occurring with infectious diseases. Frequently there is a peripheric amblyopia (Samelsohn).

NUEL replied to Sourdille that changes in the macular fibres existed in his case also and that it is difficult at such an advanced stage to determine where the disease has had its origin. He agreed with Parinaud that toxic optic neuritis was of central origin, but the bilateral seat of this affection of the central nervous system was the retina.

SESSION OF AUGUST 6TH.

ANGELUCCI discussed **the present views as to the cortical visual centre.**

He explained the mechanism of the perception of visual impressions as follows: Excitations from the outer world produce in the external layers of the retina chemical and mechanical changes which cause stimulation of the visual neurons; the stimulation of the termination of the neuron belonging to one eye can bring about an analogous stimulation of the neuron of the other eye by the transference of the excitation. The stimulation of the peripheral neuron passes to the subcortical and cortical centres and to the numerous association systems of fibres which in their turn affect the sensory and motor centres of other peripheric portions of the body.

The visual perception can arise in the consciousness only through the simultaneous stimulation of others than the peripheral neuron. In animals the higher the development the more highly developed are the neuron arcs intercalated between the retina and the visual centres. The optic lobe appears early, being absent only in the lowest animals, and the structure of the visual centres is far more complicated in the mammalia. The cortical ends of the visual neuron have, through association fibres, a direct influence upon the movements of the eye.

BERNHEIMER (Innsbruck), discussing **the same subject,** presented the matter in a very interesting way, and showed that our knowledge of the cortical terminations of the macula fibres is unsatisfactory since the opinions of different authors vary greatly even as regards the extent of the cortical visual centre. Most

authors agree that this lies in the occipital lobe. In monkeys the subcortical visual centre includes, according to Bernheimer, the entire occipital lobe up to the parieto-occipital fissure. The angular gyrus does not directly belong to the visual centre, yet it is intimately connected with it by association fibres and lies in the immediate vicinity of the optic radiation.

It would be of great value to determine exactly what is the location in the optic central organs of the fibres for central vision. Bernheimer was able to demonstrate that in the external geniculate body the macula fibres have no fixed localization but are present in all parts. Possibly a partial destruction of the external geniculate body would not destroy the function of the fibres serving for central vision.

HENSCHEN (Upsala) described **the extra-cerebral and intra-cerebral portions of the visual fibres and their peripheric and central end-apparatus.** The corpus geniculatum internum and the corpora quadrigemina have no direct part in visual perception. Henschen, contrary to Sachs and Monakow, believes that the macular fibres end near the anterior portion of the calcarine fissure.

An injury of the dorsal half of the corpus geniculatum externum, the dorsal fibres in the tract, or the dorsal cortex of the calcarine fissure causes a loss of the opposite lower quadrants of the visual fields; an injury of the ventral visual fibres in the tract or corpus geniculatum externum causes, on the contrary, a loss of the upper quadrants of the other side.

Clinical and anatomical investigations have now verified the localization of the visual centre in the calcarine fissure, but it is still impossible accurately to determine the extent of the visual centre.

MONAKOW cannot agree with Henschen in regard to the sharply limited localization of the cortical visual centre. Against that view speaks the fact that after removal of the cortical visual centre no complete degeneration of the optic radiation occurs. Clinical experience and Dejerine's pathological findings in cases of cortical blindness lead us to believe that the outer portions of the occipital lobe do not belong to the visual centre, which lies in the inner portion of this lobe.

HENSCHEN regards Bernheimer's views as to the distribution of the visual fibres in the various portions of the corpus geniculatum externum as not yet verified.

BERNHEIMER stated, however, that he had destroyed the macular region in monkeys with a discission needle and obtained an ascending degeneration of the visual fibres ; in the ganglion geniculatum externum the degenerated fibres were scattered. This distribution explains why there is never a hemianopsia of the macular region.

COSMETTATOS made in Panas's laboratory experimental investigations on the degeneration of tracts of nerve fibres following destruction of one eye or of one visual lobe. By the first experiment the location of the crossed fibres in the tract could be determined ; the latter experiment resulted in a bilateral degeneration of the oculo-motor fibres, as well as a degeneration of longitudinal fibre tracts running backward.

SESSION OF AUGUST 7TH.

SCHIÖTZ (Christiana) discussed the subject of **treatment before and after cataract extraction.**

The results of the operation depend upon the antisepsis employed, and this must be as conscientiously carried out as it is by general surgeons in capital operations. The region of the eye must be made aseptic. Particularly must that source of infection, the region of the lashes, be done away with by epilation of the lashes. The lachrymal sac must be cleansed by injections of antiseptic solutions. A bandage is to be applied experimentally before the operation in order to discover how the patient will bear it after the operation. When this dressing is soiled with purulent secretion the operation should be postponed. After the operation the eye need be bandaged for three or four days only, but the dressings are to be changed morning and evening daily. Hjort's proposition to use no bandage is worthy of notice ; in fact a bandage sometimes irritates.

LANDOLT prefers the binocular bandage after extraction, and rest in bed in a dark room. In this way prolapse of the iris is best prevented.

MACHARDY (London) does not believe in epilation of the lashes. He uses Snellen's bandage, and regards it as advantageous in many cases to fasten the patient's hands in order that he may not involuntarily disturb the dressings.

BOURGEOIS (Reims) and GALEZOWSKI believe in using the bandage longer.

VALUDE bandages only one eye and this only for four days.

The patient is kept in a light room which keeps the pupil moderately contracted and lessens the tendency to prolapse. In case of infection he washes out the eye with sublimate 1:1000 and applies a light bandage. Before operation the conjunctival sac must be carefully cleansed with formal 1:1000, but epilation of the lashes is superfluous.

LAGRANGE (Bordeaux) before the operation washes the eye and the surrounding parts with a litre of aseptic liquid, thus removing the germs in a mechanical way. He uses a bandage since it hastens the process of cicatrization.

JAVAL has convinced himself by experiment that the pressure bandage does not hinder the movements of the eye. PANAS and LAGRANGE contradict this.

VACHER (Orleans) examines into the patient's general condition before the operation and proceeds accordingly. The region of the lashes is cleansed by brushing with antiseptic solutions, conjunctiva and lachrymal passages are washed out, and a bandage is applied. The operation is done the following day. After operation eserine is instilled and a bandage is applied lightly.

TERRIEN (Paris): **The removal of secondary cataract by extraction.**

This method gives better results as regards vision than discission or partial removal. It is not adapted for all cases.

HOCQUARD (Besançon): **Histological study of the corneal section after extraction.**

The corneal scar is never straight, and frequently the epithelium dips down into the lips of the wound. By the twelfth day the posterior lamellæ of the cornea are already adherent. Descemet's membrane readily rolls inward after the section, thus rendering more difficult the cleansing of the anterior chamber.

TERSON (Toulouse): **New forceps for the removal of a portion of the anterior capsule in cataract operations.**

LOUGNON (Moulins): **A new procedure for the operative treatment of secondary cataract.**

BOURGEOIS (Reims): **Extraction of senile cataract by a latero-external incision and corneal suture.**

TRUC (Montpellier): **Two cases of reclination of cataract.**

Truc reports on two cases in which reclination gave good results. This method is indicated in patients with delirium tremens and in cases in which the operation on one eye has been unsuccessful. PANAS believed that advanced age also justified the op-

eration, which had given him good results in three cases. GAYET estimated the losses after reclination as 50 %, and WICHERKIEWICZ also regarded the operation as rarely justifiable. VALUDE had operated on two cases with favorable results and DOR on three. According to HIRSCHBERG favorable results are common in India.

VACHER: **A new method of cataract operation with a sclero-conjunctival bridge.**

The corneal section is not ended in the sclero-corneal margin, but by turning the knife back a tongue-shaped conjunctival flap 10 *mm* long is formed which renders extraction somewhat more difficult but prevents prolapse of iris and the turning over of the corneal flap.

ROLLAND (Toulouse): **On the prevention and treatment of myopia.**

Rolland treats myopia by instilling eserine and nasalorexis and obtains good results. MOTAIS (Angers) believes that myopia in the young often begins with spasm of accommodation; still, treatment with atropine and hygienic regulations is sufficient, and operative measures are only exceptionally necessary. BADAL (Bordeaux), who first carried out the stretching of the external nasal nerve has had no results with this method of treatment in myopia.

GRANDCLÉMENT (Lyons): **On uveitis iridis.**

NEUSTÄTTER (Munich): **A critique of the theories of skiascopy.**

H. WOLFF (Berlin): **Ophthalmoscopy with the electric light.** The advantages of the instrument shown were a larger field of vision and an absence of the disturbing reflexes from the cornea.

ROCHON-DUVIGNEAUD (Paris): **Demonstration of preparations of the anatomy of the orbit.**

FALCHI (Pavia): **Contributions to the histogenesis of the human retina.**

PARISOTTI (Rome): **Demonstration of a new perimeter.**

PITOU (Cherbourg): **Demonstration of a new campoperimeter.**

REYMOND (Turin): **On the local use of cupping glasses on the eye.**

GROSSMANN (Liverpool): **A new apparatus for detecting color-blindness.**

G. BULL (Paris): **A normal stereoscope.**

The new stereoscope serves to determine the absolute amplitude of convergence, the relative amplitude of convergence, and the amplitude of accommodation.

SESSION OF AUGUST 8TH.

JONNESCO (Bucharest) : **On extirpation of tumors of the optic nerve with preservation of the ball by means of temporary resection of the outer wall of the orbit.**

From his own experience Jonnesco commends highly this operation first performed by Krönlein. AXENFELD also had good results in three cases. PANAS prefers it to Lagrange's method, but the latter method is favored by DRANSART.

JONNESCO : **Glaucoma and sympathectomy**. Jonnesco commends anew the resection of the superior cervical ganglion in the radical treatment of glaucoma. Among twenty-two patients so operated a permanent marked improvement was obtained in twenty and in two cases only was there no result.

CHIPAULT and UMBERTO BRUNI (Rome) agree with Jonnesco. LAGRANGE, who performed the operation on animals, found that the resulting hypotony lasted but two months. ANGELUCCI (Palermo) regards this method as not indicated in acute, subacute, or inflammatory glaucoma. PANAS opposes it. He observed the results in a case of accidental removal in an operation for carcinoma. The only certain result of the operation is a permanent myosis. ABADIE performs the operation only in chronic glaucoma when myotics have had no effect. AXENFELD believes that iridectomy is first to be tried in glaucoma ; sympathectomy is only to be considered when iridectomy fails.

DARIER (Paris) : **On the use of dionin in ophthalmology.**

Dionin is an agent which energetically excites the lymph circulation, quiets pain, dilates the pupil, and gives good results in cases of iritis with posterior synechiæ. L. DOR (Lyons) compares its effects with those produced by sinapisms on the skin. JOCQS (Paris) had obtained good results in cases of chronic iritis by using a $\frac{1}{2}$ % solution of dionin.

CAMPOS (Paris) : **On an infection of the conjunctiva and cornea arising from a Meibomian gland.**

ROHMER (Nancy) : **On bilateral symmetrical angio-megaly of the upper lids.**

Rohmer reported on four of these cases which he had observed. The disease is characterized by an increase in the

volume of the skin, which not infrequently falls over the lid margin, becomes folded, and appears atrophic. In consequence of emotional disturbances the skin of the lids becomes red transiently like the cheeks of healthy persons. The treatment consists in an excision of a fold of skin from the upper lid. Microscopic examination of such cases had previously been made by Fehr only, who found a rarefaction of the elastic fibres of the skin. Rohmer found in one case a dilatation of the lymph channels and of the arteries and veins of the skin and subcutaneous cellular tissue. In a second case nothing abnormal was found at the microscopic examination, and even the elastic fibres appeared unaffected. Rohmer explains the disease as being the result of a structural or functional anomaly of the vascular system of the lids.

HESS (Wurzburg) discussed **the accommodation of the eye.** Two theories are in vogue. One explains the more excessive curvature of the lens during accommodation as being due to a slackening of the zonula (Helmholtz), the other refers this condition to tension of the zonula (Mannhardt, Tscherning.) The investigations undertaken by Hess showed that the zonula was relaxed during accommodation. In fact he found that after the instillation of eserine a slight trembling of the lens was observed when the eye was moved. The intraocular tension during accommodation is the same in the portion of the eye anterior to the lens as in that posterior to the lens. It is therefore futile to endeavor to prevent an increase in intraocular tension in glaucoma by ordering convex glasses. Hess does not believe in the existence of a lenticular astigmatism in consequence of unequal contraction of the fibres of the muscle of accommodation. In cases of myopia he corrects the total error without regard to any possible spasm of accommodation. SCHOEN (Leipsic) stated that during accommodation the central portion of the eye: vitreous, lens, zonula, lies in less direct contact with the sclera than during accommodative rest. Perhaps, in the first condition this portion of the eye might sink down more readily in consequence of gravity, which would explain the change in the location of the lens in accommodation.

LAGRANGE does not correct the total myopia. He does correct accurately the anomaly of refraction in every case of glaucoma, and he believes that there is an astigmatism due to partial contraction of the fibres of the muscle of accommodation. OSTWALT shares this latter view.

Clinical observations made by GUENDE (Marseilles) and by DARIER speak in favor of the Helmholtz theory of accommodation, and HOCQUART finds that anatomical investigations support this theory. After cataract extractions the latter found the empty capsule stretched tense over the vitreous, which would indicate that the zonula exercised traction when the muscle of accommodation was relaxed.

TSCHERNING (Paris): The form of the lens at rest does not correspond to that of the lens in accommodation as it should, according to the Helmholtz theory. On the contrary, without the traction of the zonula the lens has the form which it possesses in the non-accommodated eye; still in pathological cases one will find the lens in the non-accommodated eye (after death) in a condition corresponding to the form of the lens in the accommodated eye. In such cases there has been an unusual tension of the zonula during life.

JAVAL (Paris) discussed **reforms in the designation of acuteness of vision.**

In Snellen's charts the size of the letters varies without accordance with a fixed rule. Javal believes that it would be better to have the size of the test-letters increase in a geometrical series. In general one might select that cut of letter whose size is four times the breadth of a stroke. Transparent test letters are, in general, the best. In order to avoid every convention as to the selection of the smallest visual angle regarded as normal, the designation of V might be expressed according to the height of a letter recognized at a given distance.

LANDOLT does not believe that a system of designation of V according to a geometrical series would be of practical advantage since the determination is usually made at a considerable distance, 5 *m* or more.

PERGENS (Brussels) demonstrated **new charts for the determination of acuteness of vision.**

REPORT OF THE MEETING OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM, THURSDAY, JANUARY 31, 1901.

By C. DEVEREUX MARSHALL.

G. ANDERSON CRITCHETT, M.A., F.R.C.S.E., PRESIDENT, IN THE CHAIR.

Dr. G. A. BERRY read a paper on **So-called paresis of divergence.**

He cited cases and showed diagrams in support of his theory that the condition is really overaction of convergence rather than paresis of divergence. In cases of strabismus in which there is some difficulty of diagnosis he thought that this could be much facilitated by forcibly rotating the eye outwards with fixation forceps. In a true case this would be impossible, whereas if it were due to a defect in the convergent or divergent centres it would readily be accomplished.

He also read notes on some rare forms of non-paretic, non-concomitant squint in which, through faulty innervation, muscles not usually associated worked together—thus the internal rectus of one eye with the superior rectus of the other.

Dr. RAYNER D. BATTEN read a paper on **Eclipse blindness.**

The patient was a woman, aged twenty-eight, who watched the solar eclipse on May 28, 1900, without any protection than that offered by screwing up the eyes and looking between her fingers held close together. Immediately afterwards she noticed that things looked black, and the next morning she found she could only see "portions of things." She was first seen on June 6th, and was found to have lost the lower half of the field of vision in the left eye.

The vision was $\frac{6}{18}$. Above the optic disc a white patch was seen, possibly an absorbing hemorrhage, while the hazy and œdematous retina obscured the view of the disc and retinal vessels.

The œdema increased until June 20th and then rapidly cleared, ultimately leaving a patch of choroido-retinitis above the disc.

One of the upper retinal arteries was occluded and the others reduced in size. The vitreous opacities cleared and the macula was unaffected. The vision improved to $\frac{6}{12}$ in the injured eye.

In the right it was $\frac{6}{6}$. The patient was in good health and no other cause could be found for the injury except exposure to direct sunlight.

Mr. LAWFORD said he had observed three cases of eclipse blindness. There were no ophthalmoscopic changes but they all had a central scotoma which persisted with some deterioration of vision. The treatment adopted was rest.

Mr. TREACHER COLLINS had seen two cases. In one of them, which he had previously reported, the discs became very pale and there was a central scotoma. In the other, the vision improved, but the fields were greatly contracted for white, while those for color were very much smaller.

Mr. JESSOP had published three cases, in all of which the vision improved, but there was a slight permanent scotoma.

Mr. BERRY said he looked upon the scotoma as being permanent. He felt sure that the general public were not sufficiently aware that looking at the sun through blue glass was worse than using no protection at all. It was the blue and violet rays which did the mischief to the retina.

Mr. BOKENHAM mentioned that he had seen two cases, in one of which there were retinal hemorrhages and the vision was reduced to $\frac{6}{60}$. This subsequently improved up to $\frac{6}{12}$ at which it now remains, but there is a well-marked scotoma.

Mr. JOHNSON TAYLOR asked if there was keratitis punctata at any time in Mr. Batten's case. The appearance suggested that the condition might have been brought about by an irido-cyclitis quite apart from the action of the sun. The case was in many respects quite different from the ordinary cases of eclipse blindness.

Mr. BATTEN in reply stated that no keratitis punctata had been seen, and he felt quite sure that the condition had been brought about by the direct action of the sun.

A case of bullet injury of the occipital lobes with loss of half of each visual field.

The PRESIDENT read this paper. The patient was a captain in the British army and was struck by a bullet (probably a Lee- Metford) on the side of the head. He lost his sight at once but did not become unconscious for half an hour. He was comatose for eight days and at the end of that time he was still blind. He was trephined the day after the injury at the point of entrance and exit. The trephine aperture was situated 2¼ inches above Reid's base line on the right side, in a vertical line above the posterior border of the mastoid process, and 1½ inches below and slightly behind the parietal eminence, 4 inches from the external occipital protuberance. The aperture of exit was ½ inch to the left of the middle line, 2 inches above the protuberance and 1 inch below the lambda. When examined the pupils were active, the fundi normal, and the vision in each eye was ⅘ and J 1.

The lower half of each visual field was lost almost completely, the line being irregular. The patient had always been color-blind. The loss of field was evidently due to injury of the cortical visual centres. The course of the bullet must have been through the anterior part of the right middle occipital convolution, injuring also the right and left cuneus. The sudden impact probably caused temporary paralysis of the visual centres from concussion.

That there was a considerable amount of hemorrhage was proved by the rapid onset of unconsciousness, and this or the actual injury caused by the bullet may account for the persistent failure of the lower half of the visual field, though on the latter supposition it is difficult to explain the exact symmetry of the visual loss. There was no optic neuritis detected.

Mr. FISHER gave details of two cases of a similar character to that cited, the lower halves of the fields being lost—altitudinal hemianopsia.

The following card specimens were shown :

1. Mr. W. H. JESSOP : **Case of tuberculosis of the conjunctiva.**

2. Dr. A. W. STIRLING : **Specimen of primary sarcoma of the orbit.**

3. Mr. W. LANG : **New growth of the ocular conjunctiva, probably a papilloma.**

4. Mr. J. B. LAWFORD: **Concussion injury of the eyeball with a "hole" at the macula.**

5. Mr. W. T. LISTER: **Spreading opacity of the cornea following herpes ophthalmica.**

6. Mr. W. H. JESSOP: **Case of probable distension of the frontal sinus in a girl aged ten years.**

Other cases in children were mentioned by Messrs. POULETT WELLS, TATHAM THOMPSON, BERRY, and LITTLE.

7. Mr. W. C. ROCKLIFFE: **Sections of a conjunctival growth.** Owing to some doubt as to its nature it was proposed to submit the sections to a committee.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE SECOND QUARTER OF THE YEAR 1900.

(*Concluded.*)

By Prof. ST. BERNHEIMER, at Innsbruck; Dr. O. BRECHT, Prof. R. GREEFF, Prof. C. HORSTMANN, and Dr. R. SCHWEIGGER, in Berlin;

WITH THE ASSISTANCE OF

Dr. G. Abelsdorff, Berlin; Prof. E. Berger, Paris; Dr. Swan M. Burnett, Washington; Dr. Dalén, Stockholm; Dr. J. Herrnheiser, Prague; Prof. Hirschmann, Charcow; Dr. J. Jitta, Amsterdam; Dr. Krahnstöver, Rome; Mr. C. Devereux Marshall, London; Dr. P. von Mittelstädt, Metz; Prof. Da Gama Pinto, Lisbon; and others.

Translated by Dr. Ward A. Holden.

XII.—CORNEA, SCLERA, ANTERIOR CHAMBER.

299. **Markow.** Keratitis aspergillina. *Wjest. Ophth.*, March–April, 1900.

300. **Basso.** Keratomycosis from aspergillus fumigatus. *Annali di ottalm.*, xxix., 1–2, p. 33.

301. **Wolffberg.** Keratomalacia. *Wochenschr. f. Ther. u. Hyg. d. Auges*, No. 32, 1900.

302. **Kuhnt.** On the value of the corneal suture. *Zeitschr. f. Augenheilk.*, iv., 310.

303. **Salzer.** Critical and literary studies on transplantation with reference to the question of keratoplasty. *Ibid.*, iii., 6, p. 516.

304. **Plant.** The cause of keratoconus from the electric flash. *Klin. Monatsbl. f. Augenheilk.*, xxxviii., p. 334.

305. **Bossalino.** The surgical treatment of keratoconus by means of a peripheric incision in the cornea. *XV. Italian Ophth. Congress*, Turin, 1900.

306. **Bietti.** On a rare form of corneal cyst. *Klin. Monatsbl. f. Augenheilk.*, xxxviii., p. 234.

307. **Bianchi.** On epithelioma of the corneal limbus. *La clinica oculista*, April, 1900, p. 108.

308. **Parisotti.** Wart of the cornea. *Bull. della R. Acad. Med. di Roma*, xxvi., 3, 4.

309. **Kalt.** Epithelial tumors of the cornea. *Arch. d'opht.*, xx., 3, p. 126.

310. **Weinkauff.** On bilateral melanosis of the cornea. *Klin. Monatsbl. f. Augenheilk.*, xxxviii., p. 345.

311. **Callan.** Melanosarcoma of sclera. *N. Y. Eye and Ear Infirmary Reports*, viii., 1900.

312. **Thomson, E. S.** Vesicular keratitis following cataract extraction. Report of a case. *Annals of Ophth.*, April, 1900.

313. **Boeckmann, Edward.** Trachomatous pannus and periectomy. *Amer. Jour. of Ophth.*, April, 1900.

314. **Oppenheimer.** Lashes in the anterior chamber. *Deutsche med. Wochenschr.*, 1900, p. 328.

315. **Kimpel.** A case of cysticepithelial tumor in the anterior chamber. *Klin. Monatsbl. f. Augenheilk.*, xxxviii., p. 252.

MARKOW'S (299) patient, a man of fifty, had suffered for seventeen days with a serious illness some weeks before his eye trouble began. When seen the eye had been troublesome for five weeks. The central portion of the left cornea was opaque and covered with a loose fungous mass. The anterior chamber was abolished and the tension decreased. Microscopic examination of a portion of the crust on the cornea showed it to be composed of threads and spores, the picture being characteristic of aspergillus fumigatus. Hot fomentations and 1 per cent. quinine solution were used, and later iodoform and a bandage. After a week no mycelia were to be found, but the ulcer spread and the patient was dismissed with a sightless eye which was beginning to become phthisical.

Inoculation experiments on animals were not successful.

The fungus does not develop on the uninjured cornea. It appears mostly in the summer season, and the process lasts 2–3 months. The opacity of the cornea reaches its maximum on the fifth or sixth day, and then the superficial portion is cast off and the deposit forms. Perforation is unusual. HIRSCHMANN.

WOLFFBERG (301) in a case of xerosis of the conjunctiva and corneal ulcer in an infant with marasmus used yellow ointment and xeroform, and besides these, on the first and fifth days of treatment a small quantity of dionin. This caused œdema, chemosis, a visible reaction at the margin of the ulcer, lessening of the hypopyon, and eventually cicatrization of the ulcer. Under general treatment the general condition improved. The writer

regards dionin as especially indicated in cases of dryness of the conjunctiva and breaking down of the cornea.

KUHNT (302) believes that a corneal suture, like that of Kalt, after extraction is superfluous in 85 per cent. of cases, and in 15 per cent. insufficient. Kalt himself had only two prolapses in fifty simple extractions. Kuhnt believes that the wound should be protected from ectogenous infections by a conjunctival flap. He makes above the section a double pedunculated bridge-like flap which is drawn down and fixed over the upper two-fifths of the cornea by sutures. Kuhnt uses the flap only when he fears some disturbance in the course of healing: when the patient is restless, or there is suppuration in the tear sac, nose, or elsewhere in the body, and when the section has been very large. When old scars leave too little conjunctiva for the purpose Kalt's procedure is followed. The primary suture is passed through the anterior layers of the cornea only, the secondary ones through its entire thickness, at least 0.75 *mm* from its margin, from inward outward, with the assistance of a forceps with horse-shoe-like branches. Finally a conjunctival flap is placed over the wound.

PLANT (304) succeeded twice, in four experiments, in producing a change of curvature in the rabbit's cornea by means of the electric spark. This depended upon a thickening of the cornea, and endothelial lesions on the posterior surface contributed to the œdema, which appeared clinically as a parenchymatous cloudiness with superficial stippling. The membrane of Descemet had remained intact.

BIETTI (306) found that the cyst which he studied and accurately described arose from a pseudo-pterygium following a superficial marginal keratitis.

PARISOTTI (308) reports a case of papilloma arising exclusively from the cornea, a microscopic examination leaving no doubt as to its histological character. Since in this case, as in others reported, in spite of local recurrence there was no tendency to extend deep or to give rise to symptoms of malignancy in the the course of two years, Parisotti combats the opinion held by many that when the epithelial character of a corneal growth has been determined, enucleation shall be at once resorted to.

KRAHNSTÖVER.

WEINKAUFF (310) cites a case similar to that reported by Krukenberg as melanosis of the cornea, that, however, arose from thickly grouped dark brown precipitations on Descemet's membrane. In

both eyes a dark brown stripe passed vertically through the centre of the cornea, about 0.75 *mm* wide and 2 *mm* long in the right eye and 4 *mm* in the left. The eyes were free from irritation; moderate disturbance of vision; etiology syphilis.

In CALLAN'S (311) case a man of seventy-two noticed a small black spot at the temporal sclero-corneal margin some eight months before he presented himself with a large tumor which was bleeding profusely. It was first ligated and afterwards the eye was removed. The site of the tumor was 8.5 by 3 *mm*. It started from the episcleral tissue but invaded the subepithelial tissue of the cornea, the membrane of Bowman being intact except at the outer margin where the substantia propria had been attacked. The microscopical diagnosis was melanosarcoma. BURNETT.

In THOMSON'S (312) case there was a prolapse of the iris after a simple extraction. This was cut away on the third day. There was a rise in tension and the formation of small vesicles on the cornea; on the upper portion after twelve days they began to disappear. There was no anæsthesia of the cornea.

BURNETT.

For twenty-five years BOECKMANN (313) has been performing periectomy for trachomatous pannus and his success in more than one thousand cases causes him to recommend its revival. The periectomy should be broad and embrace the subconjunctival tissue and every effort should be made to secure a tough cicatrization for on this success depends. BURNETT.

OPPENHEIMER (314) states that in Fuchs's clinic among thirty thousand patients an eyelash was found in the anterior chamber five times. In other clinics this percentage is not reached. Bacterial infection in this way is rare. In about one third of the cases the lash gives rise to a tumor in the anterior chamber. It may, however, remain without doing harm; it may become absorbed or it may pass out through the scar.

KIMPEL (315) gives the history of a patient in whose eye, after a corneal injury and deposition of a lash in the anterior chamber, a cyst of the iris 2.5 *mm* in diameter developed and greatly interfered with vision. After being punctured the cyst was removed but the lash could not be grasped. Microscopically the cyst was found to be composed of epithelium, which had doubtless been carried into the anterior chamber at the time of injury, with an endothelial covering arising from the iris.

Sections XIII.–XVIII. Reviewed by DR. O. BRECHT, Berlin.

XIII.—LENS.

316. **Silfvast.** Report on 285 cataract extractions. From the ophthalmic clinic at Helsingfors. *Finska Läkares an skapets handlingar.* April, 1900.

318. **Mendel.** Cataract extraction in patients with but one eye. *Berl. klin. Wochenschr.*, xxxvii., No. 24, p. 523.

319. **Grunert.** The weight of the human lens extracted in its capsule. *Centralbl. f. prakt. Augenheilk.*, xxiv., p. 161.

320. **Knapp, P.** On recovery from injury of the bird's lens. *Zeitschr. f. Augenheilk.*, iv., 1, p. 33.

321. **Kiribuchi.** Experimental investigations on cataract and other eye affections from lightning stroke. *Graefe's Archiv*, l., p. 1.

322. **Randolph.** The regeneration of the crystalline lens. *Johns Hopkins Hospital Reports*, vol. ix. Also *Welch Festschrift*, 1900.

323. **Tiffany.** Congenital aphakia and irideremia. *Journ. Amer. Med. Assoc.*, April 28, 1900.

324. **Balson, A. E.** Cystoid cicatrization following cataract extraction with periodical escape of aqueous; report of a case. *Ophth. Record*, June, 1900.

325. **Reik.** A case of microphakia. *Ibid.*

326. **Lemere, H. B.** Summary of cataract operations performed at the N. Y. Eye and Ear Infirmary for the year ending Sept. 30, 1899. *N. Y. Eye and Ear Inf. Repts.*, viii., 1900.

SILFVAST (316) reports on the extractions of senile cataract in the clinic at Helsingfors, between 1891 and 1898. 150 extractions were done with iridectomy and 185 without.

The results were as follows:

	With Iridectomy.	Without Iridectomy.
V $\frac{1}{6}$ – 1	80.80 %	69.91 %
V < $\frac{1}{6}$ > $\frac{1}{10}$	17.50 %	18.59 %
V < $\frac{1}{10}$ – 0	1.70 %	11.50 %
Loss of vitreous	1.33 %	0.75 %
Infection, destroying vision	4.00 %	4.40 %
Transient iritis	2.00 %	2.96 %
Incarceration of iris	4.67 %	—
Prolapse of iris	—	12.15 %
Astigmatism	1.33 %	5.20 %

According to these statistics the combined operation gave a better result than the simple. DALÉN.

MENDEL (318) advises, when patients have lost one eye from cataract operation, to do a preliminary iridectomy on the other, if need be in narcosis.

GRUNERT (319) found, by weighing twenty-eight cataracts extracted in the capsule, that the lens of immature senile cataract is,

on an average, 21 *mg* heavier than that of mature cataract, which agrees well with the clinical view that senile cataract arises from the absorption of liquid.

P. KNAPP (320) finds by experiments on the eyes of buzzards that perforating wounds of the lens mostly do not lead to opacity in the interior of the lens. There is actual breaking down only close beneath the wounds in the anterior and posterior capsule while the remaining portion of the wound canal is filled with a homogeneous transparent mass. The wound in the anterior capsule is first closed by a deposit of fibrin and later by a rapid proliferation of capsular epithelium. The wound in the posterior capsule is closed by a proliferation of epithelial cells from a distance.

KIRIBUCHI (321) found that an electric discharge toward the supraorbital region of the rabbit produced extensive hyperæmia of the conjunctiva, iris, ciliary body, and choroid, and in the lens —as a consequence of the hyperæmia of the ciliary body—partial and total transitory cataract, and in the cornea opacities as dense as in interstitial keratitis. The choroidal hyperæmia must be regarded as the cause of the atrophy of retina and optic nerve that develops. These injuries are to be regarded as chiefly the results of the electrolytic action of the electric discharge, and perhaps also of the ultra-violet rays.

These investigations by RANDOLPH (322) on the regeneration of the crystalline lens were awarded the Alvarenga prize of the College of Physicians of Philadelphia, July 14, 1899, and were instituted in order to determine whether the reports of numerous authors (mentioned in the bibliography appended to the paper) as to the regeneration of the lens in certain animals could be verified. His first experiments were on rabbits, and twenty lenses were extracted. As regards this animal, he concludes that the lens is regenerated only when some of the cortical matter is left, and that a removal of the capsule always gives a negative result. Severe inflammation, as panophthalmitis and cyclitis, also gives no result, but a slight iritis is beneficial to the new formation. The regenerated lens is lenticular, it is sometimes ring-shaped or semi-lunar. The size of the lens does not seemingly increase after a certain period. It was regenerated once in six weeks. In newts, on the other hand, the lens can be regenerated when it is removed in the capsule. In 10 cases it was regenerated in 6. The cells taking on their vicarious action seem to come from the iris, as pointed out by Wolff. BURNETT.

TIFFANY (323) reports an examination of two brothers, in whom he was not able to demonstrate the existence of a lens, except a remnant of opaque matter at the periphery. There was trembling of the iris in both cases. The eyes were small. Contrary to what was to be expected, the eyes were myopic. Vision in one boy was $\frac{6}{200}$; in the other, $\frac{8}{200}$. He also reports a case of irideremia, in which an enucleation was made. The cornea was opaque, the vitreous fluid. There was no iris, but a dense thick fibrous membrane, presumably the remains of the hyaloid membrane, behind the lens, which was calcareous. This patient was a sister of the two boys with no lenses mentioned above.

BURNETT.

In BALSON'S (324) case the extraction was smooth, but union was delayed at centre of incision for ten days. This reopened a number of times. Pure ichthyol applied to the wound, and a pressure bandage applied, finally effected a cure.

BURNETT.

REIK (325) reports a case of very diminutive lens, of normal transparency, in a rachitic child of eight months. The corneæ were large. Pupils, when dilated, 8 *mm* in diameter, and this revealed the lens in its entirety. The fundus appeared normal.

BURNETT.

These were made at the New York Eye and Ear Infirmary (326), for the year ending September 30, 1899, 180 operations for cataract, of which 110 were simple, 62 combined, and 8 with preliminary iridectomy. The average length of stay in hospital was seventeen days. There was 1 failure from panophthalmitis, 6 perception of light or movements, the rest had V from $\frac{20}{20}$ to $\frac{8}{200}$. The cases are carefully tabulated. BURNETT.

XIV.—IRIS.

327. **Michel.** The causes of primary iritis as shown by statistics. *Münch. med. Wochensch.*, xlvii. 25,. p. 853.

328. **Lagrange.** A contribution to the study of cysts of the iris. *Arch. d' opht.*, xx., 5, p. 272.

329. **Oliver.** Gumma of iris and ciliary body. Recovery with normal vision. *Amer. Journ. Med. Sciences*, Apr., 1900.

330. **Hall, A. B.** Iritis senium. *Journ. Amer. Med. Assoc.*, June 3, 1900.

MICHEL (327) found that of 84 cases of primary iritis seen in Wurzburg in the course of two years and a half, 29, or 34.5 %, were associated with chronic nephritis, 13, or 15.4 %, with diseases of the

circulatory apparatus, 31, or 36.8 %, with tuberculosis, 6, or 7.1 % with various diseases, and 5, or 5.9 %, with syphilis. Primary iritis occurs exclusively in connection with general diseases, and very frequently with chronic nephritis. A general examination is desirable since on the results of this the treatment must be based. Chronic nephritis and affections of the circulatory apparatus play an important rôle in the production of parenchymatus keratitis also.

In LAGRANGE's (328) first case a pearl cyst lined with pavement epithelium developed in the iris some months after an iridectomy made on account of a traumatic closure of the pupil. An operation was done for removal of the cyst, but only little vision remained. In the second, very unusual case, there developed without any trauma, in a boy of nineteen, a transparent cyst in the iris tissue filling half the anterior chamber. It appeared at the site of a small spot which had been noticed nine years before. After the liquid contents, resembling aqueous humor, had been drawn off with a hypodermic syringe, the iris, including the cyst, was excised so that a large coloboma outward was produced. A slight recurrence necessitated a second operation.

The wall of the cyst was lined with several layers of cubical epithelial cells resting on a basement membrane, and it lay imbedded in the thickened stroma of the iris and nowhere came in contact with the uveal layer. The author describes the cases already known, and instead of classifiying these cysts as spontaneous and traumatic he would divide them into epiblastic and mesoblastic. The former are lined with epithelium and arise from trauma or, as in the present case, they arise congenitally in the ectoderm like the dermoid cysts. The mesoblastic cysts are lined with endothelium and their walls contain only mesoblastic elements. They arise from trauma, inflammation, synechia, and hemorrhage into the iris. v. MITTELSTÄDT.

The case related by OLIVER (329) was that of a syphilitic who had lost one eye from what was evidently gumma of the iris and ciliary body some years before. In his fifty-seventh year he was attacked with the same disease in the remaining eye, which, however, was saved by means of strong mercurialization, mydriatics, and hot stupes. The gummous material discharged and passed into the anterior chamber. There were two slight relapses within eighteen months, but normal vision was the final outcome. There was a temporary change from hypermetropia and astigmatism to compound

myopic astigmatism, and between the attacks there was an unusual form of neuro-retinitis. BURNETT.

HALL (330) has encountered some cases of mild iritis in persons very advanced in years, which evidently begins as a conjunctivitis and is easily overlooked. The adhesions are not usually at the pupillary edge of the iris. Full atropinization is the proper treatment. BURNETT.

XV.—CHOROID.

331. **Schulz.** The diagnostic value of exploratory puncture in sarcoma of the choroid. *Kl. Monatsbl. f. Augenheilk.*, xxxviii, p. 315.

332. **Guaita.** A contribution to the study of sarcoma of the choroid. *Ann. di Ottalm.*, xxvii., 6.

333. **Key, Einar.** A case of sarcoma of the choroid with secondary atrophy of the eye. *Hygiea*, Feb., 1900.

334. **Wagenmann.** A case of multiple melanosarcoma with peculiar complications in both eyes. *Deutsche med. Wochenschr.*, xxvi., 10, p. 261.

335. **Gruening.** The early recognition of choroidal sarcoma. *N. Y. Eye and Ear Infirmary Reports*, viii., 1900.

SCHULZ (331), after having made two exploratory punctures of a choroidal sarcoma without result, advises against this and similar procedures on account of their uncertainty and the danger of spreading the germs of the disease.

GUAITA'S (332) first case was one of melanosarcoma of the choroid that, according to the histological examination, had proceeded from the endothelium of Schwalbe's lymph spaces in the outer portion of the choroid. There were no evidences of hyaline degeneration.

His second case was one of spindle-celled leucosarcoma with extensive hyaline degeneration. KRAHNSTÖVER.

In KEY'S (333) patient, a woman of thirty-two, the following symptoms were observed in succession: 1. Gradual diminution of vision with mild symptoms of glaucoma (haloes, cloudiness of vision, slight intermittent pain). 2. Detachment of the retina and complete amaurosis. 3. Absolute glaucoma with severe pain. 4. Iridocyclitis with atrophy of the ball. When the eye was enucleated seven months after the beginning of the disease the condition was as follows: The ball somewhat sunken, atrophic, and cuboidal. T—. Cornea flattened. Anterior chamber almost filled with the luxated lens. To the temporal side of the lens a crescentic cleft in which a brown, finely-nodular tumor mass is visible. Examination showed that the tumor had filled

the temporal side of the ball but had not perforated. The central portion of the tumor was grayish-yellow, necrotic, and surrounded by a thin darkly-pigmented covering composed of spindle cells. The limit between the peripheric and the central portion of the tumor was sharp. The latter was very vascular. DALÉN.

WAGENMANN (334) reports a remarkable case of multiple melanosarcoma of the breast, neck, ear, temples, mouth, and limbs, with metastases in both eyes. The patient was a man of twenty-eight. At first the right eye was normal with a light bluish-gray iris, while in the left there was a severe iridocyclitis with increased tension and a tumor in the iris angle, with V = fingers at 2 *m*. Six weeks later the left eye was entirely free from irritation, the tumor had vanished, and the iris in toto was of a grayish-brown color. With − 2. D, V = $\frac{6}{1.5}$, fundus normal. Six months later there was a recurrence in the left eye with marked ciliary injection, the posterior surface of the cornea being stippled with numerous dark-brown, sharply outlined, fine spots of pigment. Shortly before this it was found that the right eye, which previously had been healthy and still was free from irritation, had many membranous opacities of the vitreous besides small dark-brown spots, while the fundus was normal and vision varied between $\frac{6}{10}$ and $\frac{6}{6}$.

GRUENING (335) reports a case in which he diagnosticated a choroidal sarcoma in its early stage by means of the ophthalmoscope. It was in the macular region and protruded 2 *mm* above the level of the fundus. At its base it rose about 3.D.D. Examination after enucleation confirmed the diagnosis.

BURNETT.

XVI.—VITREOUS.

336. **Van Duyse.** Connective-tissue proliferation after hemorrhage or remains of the hyaloid artery (?). Central coloboma. *Arch. d'opht.*, xx., 4, p. 228.

337. **Verhoeff.** A case of persistent hyaloid artery associated with an unusual outgrowth from the optic disc extending over the macular region. *Amer. Journ. of Ophth.*, May, 1900.

VAN DUYSE (336) describes the congenital changes found in the fundus of a man of twenty. A sharply outlined, irregular, white, tendinous mass occupying the centre of the retina threw out two projections into the vitreous and surrounded the lower portion of the disc on one side and covered a coloboma of the

macula on the other. A striped, transparent membrane stretched between this mass and the upper-outer margin of the disc. The author believes that this represented the remains of the primitive embryonic vitreous which had become transformed into connective tissue, while the hyaloid artery and canal had disappeared. The temporal location of this formation was due to the displacement of that portion of the fœtal cleft which lies external to the bundle of optic-nerve fibres, by retinal elements being formed between them and pushing that portion of the cleft to the temporal side.

In VERHOEFF'S (337) case there was a persistent hyaloid artery, and in addition to this there was a white band extending from the disc to the macular region which seemed to be united to the retina. Fundus otherwise normal. Vision $= \frac{20}{100}$.

BURNETT.

XVII.—GLAUCOMA.

338. **Kraus.** Primary glaucoma in the Göttingen clinic. *Inaug. Dissert.*, Göttingen, 1900.

339. **Bylsma.** A case of glaucoma beginning as tinnitus aurium. *Weekblad v. Geneeskunde*, 25.

340. **Hermann.** A case of hemorrhagic retinitis with glaucoma following. *Inaug. Dissert.*, Göttingen, 1900.

341. **Grunert.** A contribution to the extirpation of the superior cervical ganglion for glaucoma. *Klin. Monatsbl. f. Augenheilk.*, 1900, xxxviii., p. 250.

342. **Schimanowsky.** On the question of excision of the superior cervical ganglion for glaucoma. *Wjest. Ophth.*, May–June, 1900.

343. **Windler.** On posterior sclerotomy. *Inaug. Dissert.*, Marburg, 1900.

344. **Truc** and **Cauvin.** Iridectomy in chronic simple glaucoma; some late results. *Arch. d'opht.*, xx., 1, p. 1.

KRAUS (338) reports on 128 cases of primary glaucoma seen in the Göttingen clinic, comprising 0.4 per cent. of the total attendance. The statistics are as follows: Most frequent age, fifty to seventy years; more males than females; almost constantly bilateral; in 10 cases normal visual field, in 24 cases opacities of the lens, in 2 cases aphakia; 99 operations were performed, 46 times iridectomy, 49 times sclerotomy, and 4 times enucleation.

BYLSMA (339) treated a patient who complained of tinnitus and the seeing of colored rings about a light. A week after the first examination there was a typical attack of glaucoma. The author believes that an affection of the sympathetic must be supposed to have existed.

HERMANN (340) had the opportunity of examining clinically and microscopically a case of hemorrhagic retinitis with consecutive glaucoma. There were found general changes in the vessels which were regarded as angiosclerotic, chiefly hyaline thickening of the arteries without thrombotic or embolic blocking of either of the central vessels, and without narrowing of the lumen from cellular proliferation.

GRUNERT (341) reports a case of glaucoma in which extirpation of the superior cervical ganglion of the sympathetic had not the slightest effect.

SCHIMANOWSKY'S (342) patient, a man of seventy, has absolute glaucoma in the left eye and chronic simple glaucoma in the right, with V = 0.1, normal field, and excavation not sharply marked. Pilocarpine did not contract the pupil and eserine did so but slightly, while V and T remained unchanged. Excision of the superior cervical ganglion was done, after which vision gradually rose to 0.4. The pupil remained normal, and there were only two transient attacks of increased tension. The literature is discussed and the author hopes that with farther observations accurate indications for this operation may be laid down.

WINDLER (343) discusses the value of posterior sclerotomy as indicated in the literature and report on eight operations done in Marburg—seven for glaucoma and one for detachment of the retina. In detachment it is not of certain advantage and in glaucoma its effect is only transient. It seems to be useful as a preliminary operation to iridectomy in cases of glaucoma with a shallow anterior chamber.

TRUC and CAUVIN (344) strongly recommend iridectomy for chronic simple glaucoma, which is the most frequent cause of blindness about Montpellier. A medium-sized iridectomy may be made but it should be done as early as possible if the result is to be permanent, as is shown by numerous observations of the authors extending over a long period. v. MITTELSTÄDT.

XVIII.—SYMPATHETIC OPHTHALMIA.

345. **Pfalz.** On sympathetic irritation. *Ophth. Klinik*, 1900, 5–6.

346. **Chevallereau.** Critchett's operation. Sympathetic ophthalmia. *Ann. d'ocul.*, cxxiii., p. 298.

PFALZ (345) distinguishes sharply between sympathetic inflammation and irritation. The symptoms of irritation he divides into reflex-sensory on the part of the fifth nerve, reflex functional

on the part of the optic nerve, and neurasthenic, all being transient and associated with pain in the injured eye. Therapeutically he recommends enucleation when there are undoubted signs of sympathetic irritation, and when the injured eye is painful, and always when the eye is blind.

CHEVALLEREAU (346) saw an attack of iridocyclitis come on eighteen days after a Critchett staphyloma operation, which did not pass off until the stump was enucleated, subconjunctival injections and inunctions of mercury having been of little benefit.

BERGER.

Sections XIX.–XXII. Reviewed by DR. ABELSDORFF, Berlin.

XIX.—RETINA AND FUNCTIONAL DISTURBANCES.

347. **Birch-Hirschfeld.** A contribution to the knowledge of the retinal ganglion cells under physiological and pathological relations. *Graefe's Archiv*, l., 1, p. 166.

348. **Druault.** Researches on the pathogenesis of quinine amaurosis. *Monograph*, Paris, 1900.

349. **Schoenefeld.** On thrombosis of the central vein of the retina. *Inaug. Dissert.*, Giessen, 1900.

350. **Sachs, M.** Spasm of the retinal arteries in a case running the course of embolism of the central artery. *Beiträge z. Augenheilk.*, 44, p. 34.

351. **Fromaget.** Hemorrhagic detachment of the retina from strain. *Bull. de la Soc. de méd. et chir. de Bordeaux*, March 9, 1900.

352. **Emanuel.** A case of glioma of the pars ciliaris retinae with remarks on retinal tumors. *Virchow's Archiv*, clxi., p. 338.

353. **Linde.** Hemianopsia in one eye with hallucinations of smell. *Monatsschr. f. Psych. u. Neurol.*, vii., p. 44.

354. **Prümm.** Contributions to the pathology and therapy of chorio-retinitis disseminata. *Inaug Dissert.*, Giessen, 1900.

355. **Coplan, M.** Quinine amblyopia. *Journ. Amer. Med. Assoc.*, May 26, 1900.

356. **Sloggett, H. C.** A case of reflex amaurosis. *Annals of Ophth.*, April, 1900.

357. **Harlan, G. C.** Transient real blindness in hysteria. *Journ. Nervous and Mental Disease*, April, 1900.

358. **Kuh, Sydney.** A case of amaurotic family idiocy. *Ibid.*, May, 1900.

BIRCH-HIRSCHFELD'S (347) extensive investigations increase our knowledge of the normal anatomy and of the physiology and pathology of the ganglion cells of the retina. Sublimate fixation and staining with thionin-erythrosin gave him the best results. Cadaveric changes are found in the ganglion cells as early as two hours after death and after seven hours no Nissl bodies are found,

so that if correct results are to be obtained fixation must be done soon after death.

In rabbits differences are found in eyes that have been exposed to light and eyes that have been kept bandaged. In the light eyes the chromatin bodies lose their sharp outline, the nuclei of the inner nuclear layer become poorer in chromatin, and the notching of the chromatin bodies of the outer nuclei disappears.

When rabbits are exposed to the electric arc light for a short time the chromatin in the ganglion cells is decreased temporarily. A long exposure leads to complete disappearance of the chromatin bodies and shrinking of the cell.

Experimentally, chromatolysis with degeneration of the cell was found to follow slow bleeding, section of the optic nerve, etc.

Poisoning with quinine and male fern caused a disappearance of the Nissl bodies and the appearance of vacuoles in the body and nucleus of the ganglion cells.

The most important results of these investigations seem to be the confirmation of the idea (Pergens, Mann,) that the function of the ganglion cells is morphologically expressed, and that many toxic substances, as Holden first showed by experiments on dogs, exercise their primary effect upon the ganglion cells of the retina.

DRUAULT'S (348) monograph shows evidence of very painstaking and accurate work. He finds that quinine produces amaurosis in dogs and cats similar to that produced in man, but in rabbits, Guinea-pigs, and mice its action is entirely different and much less positive. In dogs the primary changes are in the ganglion cells and particularly in the cells in the periphery of the retina. Later the optic nerve fibres arising from these cells break down. Changes in the nuclear layers are scarcely perceptible. (The reviewer, like Druault and Nuel, has failed to find marked changes in the nuclear layers of the dog's retina in quinine poisoning, such as Birch-Hirschfeld describes in the rabbit's retina. In experiments made on dogs six years ago, Dr. van Gieson and the reviewer failed utterly to find the differences described by Mann in light and dark rabbits' eyes. It is well known that the cells of the rabbit's retina differ greatly in the normal state, and that any slight variation in the technique of preparation will produce marked changes in the normal retina, and for this reason most of them that have worked much on the finer changes in the retina have given up rabbits altogether, since the interpretation of the changes found is so difficult.) HOLDEN.

SCHOENEFELD (349) gives the clinical histories of all the cases of thrombosis of the retinal veins seen in the Giessen clinic in the last ten years. There were 18 patients, the sexes being about equally divided. The diagnosis was made by the ophthalmoscopic examination, as Michel described the clinical picture, by the sudden onset of the affection, and the diminution of vision. No pathological examinations were made.

In 7 cases there was arterio-sclerosis, in 3 heart lesions, in 2 emphysema of the lungs, and in 2 diabetes mellitus. In a man of thirty-nine the thrombosis followed a complicated injury of the skull with exposure of the cavernous sinus, and led to complete loss of vision. In 4 cases the thrombosis led to secondary glaucoma. As regards the semiotic significance, it may be said that death from apoplexy some months after the attack followed in 2 cases, and in 2 an apoplexy preceded.

SACHS's (350) patient was a man of fifty-four whose vision was reduced to perception of light with the ophthalmoscopic picture of embolism of the central artery. Pulsation could still be obtained in one vein and in the corresponding artery annular constrictions appeared and moved distally with a peristaltic movement to the point where the vessel branched. Three days later the spasm had ceased, but the picture was the same. The author believes that other cases must be observed before it can be determined whether changes in the vessels may produce such spasms or whether the contrary is the case.

FROMAGET (351) observed a case in which a medical student while playing football suddenly noticed a disturbance of vision in his left eye. He found a slight ecchymosis of the conjunctiva and an extensive hemorrhage into the retina with detachment. The hemorrhage became absorbed, the retina became attached again, and finally vision improved. BERGER.

EMANUEL (352) describes an eye which was shown by Leber at the Heidelberg Congress of 1898. The eye was removed from a boy of five, for ciliary staphyloma. Examination revealed a tumor in the ciliary body and iris which had led to an extensive intercalary ectasia. The place of origin was the pars ciliaris retinæ. The structure of the tumor, it being composed of cells with a large nucleus and little protoplasm, caused the diagnosis glioma to be made. The " rosettes " which Wintersteiner regards as characteristic were found also. Wintersteiner's designation, " neuroepithelioma," does not seem proper to the author since

the "rosettes" are composed of indifferent cells. Thus glioma may arise from the pars ciliaris retinæ which stands in structure near the "undifferentiated retina."

The reports in the literature of tumors springing from the pars ciliaris retinæ and designated carcinoma and the like are critically reviewed by the author, who concludes that there has not been a single case of tumor of retinal origin reported which could be considered as belonging to any group other than the gliomas.

According to PRÜMM'S (354) report there were seen in the Giessen clinic between 1879 and 1899, 100 patients with chorioretinitis, 57 men and 43 women; in only seven cases was the affection confined to one eye. In most cases the affection began at the age of puberty. Ætiologically syphilis was proven to exist in 7 cases, and was supposed to exist in 10, while in the rest the etiology was not clear. Besides foot baths and diaphoretic treatment iodide of potassium was used, and also subconjunctival injections of bichloride or salt solution, which in some cases were of service.

The first of COPLAN'S (355) patients was a boy of three years who had ingested thirty grains of quin. sulph. in twenty-four hours. He became totally blind with a pale disk and obliterated arteries. In six days he saw as well as ever. No result of perimetric examination or appearance of fundus later given. The second case was a woman of thirty who took 150 grains in twenty-eight hours. There were the usual ophthalmoscopic appearances. Recovery on eighth day. BURNETT.

SLOGGETT (356) reports a case of a woman of thirty-six who became blind in the left eye in the course of two days, suffering some, but not considerable, pain. The fundus was absolutely normal. After the removal of a number of decayed teeth and roots she immediately regained her vision. BURNETT.

While HARLAN (357) has met with many cases of ordinary "hysterical blindness" in which there existed a vision which could be demonstrated by some means, he reports a rare case of real blindness in an hysterical subject, in which all the tests, especially that of prisms in accordance with the method of v. Nelz, failed to cause any movement in the blind eye. It did in the other, showing that there was no response at the brain centre for vision. In a few days vision returned rather suddenly as usual. BURNETT.

In the case of amaurotic idiocy in a Jewish child of thirteen months reported by KUH (358) there were some features not usually present in similar cases already reported. There were hydrocephalus and very frequent epileptic spasms. C. H. Beard made the ophthalmoscopic examination and found the usual changes at the macula. BURNETT.

XX.—OPTIC NERVE.

359. **Peters.** On a case of retrobulbar neuritis, due to chronic benzine poisoning. *Sitz.-ber. d. Niederrhein. Gesellsch. f. Natur. u. Heilkunde zu Bonn*, May 21, 1900.

360. **Batten, R. D.** Hereditary optic atrophy in three brothers exposed to lead poisoning. *Ophth. Review*, June, 1900.

361. **Holden.** The sequence of changes in the optic chiasm produced by acromegaly, as exemplified in three cases. *Arch. of Neurol. and Psychopathol.*, ii., 1899.

PETERS (359) performed discission on a girl of fourteen for high myopia, but while the fundus appeared normal the acuteness of vision was not satisfactory. He then found a central scotoma for red and green, due apparently to the patient's habit of inhaling benzine to induce intoxication. After this was stopped, no scotoma could be made out, but the acuteness of vision remained as before.

George F., plumber, aged twenty-seven, was seen in August, 1896, by BATTEN (360), when he complained that his sight had been failing rapidly for a month. He smokes two ounces of shag weekly. R V, counts fingers, J. 16.; L V, fingers, J. 20. No change seen in the media or fundi.

In December, 1896, the OD's were pale. Veins tortuous and arteries small. Fields slightly contracted on temporal sides; there was also a central scotoma for red and green.

William F., brother, plumber, seen in Jan., 1897. His age was twenty-two. The sight failed suddenly a few weeks previously. The general health was good, and there were no signs of lead poisoning. R V, $\frac{1}{60}$, J. 20; L V, $\frac{1}{60}$, J. 20. He could recognize no color but blue, and the OD's were pale and atrophic.

In March, 1899 the condition was a little more marked.

Robert F., brother, seen in February, 1897. R and L V = $\frac{6}{6}$.

In January, 1900, the sight failed rapidly in two weeks, with well marked optic neuritis, R V = $\frac{1}{60}$ J. 19. L V = $\frac{6}{12}$ J. 4.

In ten days . . . . R V = $\frac{1}{60}$. L V = $\frac{6}{36}$.

On February 5th . . — L V = $\frac{1}{60}$.

The neuritis rapidly subsided and gave place to atrophy.

There was a slight lead line on the gums, and Dr. Risien Russell, who examined the patient, thinks that there is a great family liability to Leber's atrophy, and that very slight poisoning with lead has determined the attack, as in no other members of the family except these three, who all worked in lead, has it developed.

None of the cases have improved under treatment.

MARSHALL.

HOLDEN'S (361) study of chiasma lesions in enlargement of the pituitary body is based on three cases, which he has examined pathologically. His conclusions are that at first the posterior portion of the chiasm is compressed, and following this the posterior and middle portions are flattened and forced upward, and are in this manner separated from the anterior portion, which is protected by the bone underneath. Later the anterior portion of the chiasm is encroached upon and arched directly forward. Finally the chiasm may be severed completely. The result of this compression usually shows itself by its effect on the visual fields, which may assume any form according to the parts pressed upon and the extent of the pressure, and may vary at different periods of the disease. The article is well illustrated.

BURNETT.

XXI.—INJURIES, FOREIGN BODIES, PARASITES.

362. **Germann.** Injury of the left eye with a splinter of iron; unexpected result of skiagraphy. *St. Petersburg. med. Wochenschr.*, No. 16, p. 158, 1900.

363. **Schreiber.** On the magnet extraction of iron foreign bodies from the interior of the eye. *Münch. med. Wochenschr.*, No. 16, p. 558.

364. **De Vincentiis.** Electricity in the diagnosis of a subretinal cysticercus extracted through the sclera. *Ann. di Oltalmol.*, xxviii., p. 191.

365. **De Berardinis.** A pathological and clinical contribution to the subject of intraocular cysticercus. *Ibid.*

366. **Talko.** Forty-eight cases of ocular cysticercus in Poland. *Postemp. okuleshyczny*, March–April, 1900.

367. **Allport.** A case of foreign body in the lens, cataract, iridectomy, removal of steel with magnet, removal of lens, intraocular hemorrhages, evacuation of hemorrhages, good result. *Ophth. Record*, June, 1900.

GERMANN'S (362) patient was injured in the left eye by a splinter of iron. The sideroscope reacted positively, but attempts at extraction with the large and with the Hirschberg magnet were in vain. It was supposed, therefore, that the foreign body lay in the orbit. Two months later a skiagraph of the profile revealed a round foreign body in the upper lid, and the sideroscope again reacted positively. The plate showed the image of the upper lid

of the uninjured eye, however, and palpation revealed the presence of a foreign body here. The patient remembered he had suffered an injury at this point years before, and the foreign body had simulated a foreign body in the other eye.

SCHREIBER (363) has not been able to use the sideroscope since the electric street railways were installed in Magdeburg, but in suspected cases he uses Schlösser's large magnet directly with good result. A meridional incision is made through the sclera for remaining foreign bodies in the vitreous. Hirschberg's magnet is used only for foreign bodies that have perforated the cornea or lie in the iris, or to remove foreign bodies that have been drawn into the anterior chamber by the large magnet.

DE VINCENTIIS (364), in a case of detachment of the retina in which the presence of a cysticercus was suspected, found that the use of the faradic current caused an unmistakable movement behind the otherwise immovable retina. The parasite thus discovered was safely removed through a scleral incision.

KRAHNSTÖVER.

DE BERARDINIS (365) believes with de Vincentiis that the cause of the death of cysticerci in the eye is the resistance of the surrounding capsule, which hinders the growth of the parasite. He found great numbers of giant cells about living cysticerci, which opposes the view of v. Schroeder that these play a rôle in killing the cysticercus. Equally untenable is the view of Wagenmann, that the spontaneous death of the parasite causes the appearance of quantities of giant cells. Tubercle bacilli were never found, even when the specimens were hardened in formol.

KRAHNSTÖVER.

IN ALLPORT'S (367) case the piece of steel was seen lying in the lens of a man of twenty-seven. A corneal incision was made, and the piece of steel extracted by means of a magnet; afterwards the lens was taken out. Hemorrhages followed into the anterior chamber, but after the blood was evacuated healing, with good vision, took place. BURNETT.

XXII.—OCULAR DISTURBANCES IN GENERAL DISEASES.

368. **Peters.** Ocular affections due to *Primula sinensis*. *Sitz. ber. d. Niederrhein. Gesellsch. f. Natur. u. Heilkunde zu Bonn*, May 21, 1900.

369. **Trousseau.** The diagnostic value of iritis in syphilis. *Ann. d. ocul.*, cxxiii, p. 358.

370. **Purtscher.** A contribution to the knowledge of ophthalmia hepatica. *Graefe's Archiv*, l., 1, p. 83.

371. **Parisotti.** A case of ophthalmic hemicrania. *Bull. d. R. Accad. med. di Roma*, xxii, 3-4.

372. **De Falco.** The medico-legal importance of examination of the eyes in neurasthenia. *Giorn. med. del R. esercito*, xlviii., No. 3.

373. **Fromaget.** Hysterical vasomotor disturbances of the conjunctiva. *Bull. de la Société de méd. et de chir. de Bordeaux*, March, 1900.

374. **Fisher, Theodore.** Swelling of the eyelids with intermittent albuminuria in children. *Brit. Med. Journ.*, April, 1900.

375. **Chance, B. K.** The ocular findings in the study of twenty-three cases of epidemic cerebro-spinal meningitis. *Annals of Ophth.*, April, 1900.

376. **Stillson, J. O.** The middle turbinate body as a factor in ocular disturbance and the indications for its partial or complete removal. *Amer. Journ. of Ophth.*, June, 1900.

377. **Morton, H. McI.** Upon the relationship of certain catarrhal and purulent inflammations of the conjunctiva to urethritis and arthritis. *Ophth. Record*, June, 1900.

PETERS's (368) patient suffered from general disturbances and a dermatitis of the hands and face with irritation of the conjunctivæ and iritis in the right eye. Peters diagnosed the case as the skin affection, repeatedly described, which is caused by contact with primroses. The patient had had a primrose in her room for two days and had smelled it repeatedly. Powdering the skin and using scopolamin soon led to recovery.

Peters believes the affection to be due not to the hairs of the plant—the cornea was intact—but to the ætheric oil given off from the flower.

From a consideration of forty-six cases, TROUSSEAU (369) concluded that cases of syphilis beginning with iritis are usually severe, since he found a favorable course in six cases only, severe complications in nine, progressive paralyses in three, tabes in twelve, and symptoms of cerebral syphilis in eight cases.

BERGER.

PURTSCHER (370) adds another case of changes in the eye from liver disease to those previously reported by Bass and Hori.

The patient was a woman who had had a clinical diagnosis of hypertrophic cirrhosis of the liver made in life, and at the autopsy a purulent cholocystitis with abscesses of the liver was found.

The patient had suffered from xerosis of the conjunctiva and cornea, diminution of the light sense, and yellow vision. In the course of the disease a transient iritis appeared in both eyes, and the fundus took on a whitish-yellow color except at the

macula. Before her death the eye symptoms had largely disappeared. Microscopic examination revealed a drying of the epithelium of the bulbar conjunctiva and of a portion of the cornea with œdema of the conjunctiva, extensive adhesions between the choroid and sclera about the posterior pole of the eye, marked hyperæmia of the posterior portion of the choroid with accumulations of multinuclear leucocytes in the veins and capillaries. In the left eye there was a small sarcoma in the choroid inward, backward, and below. The changes found in the retina were slight.

PARISOTTI'S (371) patient was a woman who suffered with scintillating scotoma with consecutive hemicrania. On same occasions an absence of the lower halves of the fields was observed and confirmed perimetrically. An ophthalmoscopic examination showed that all the arteries of the upper half of the retina were constricted until they were thread-like, while those of the lower half preserved their normal calibre. After the attacks passed off the arteries appeared alike. KRAHNSTÖVER.

DE FALCO (372), in a case of suspected simulation in an otherwise healthy soldier, found, through the examination of the eyes, a marked neurasthenia which was sufficient to explain all the symptoms complained of. The author describes the case in great detail and gives a comprehensive picture of all the eye symptoms known to occur in neurasthenia, attributing them all to the two causes which are pathognomonic for neurasthenia in general, viz., disturbance of nervous equilibrium and of nervous excitability. KRAHNSTÖVER.

FROMAGET'S (373) patient with hysterical lachrymation exhibited marked dilatation of the conjunctival vessels, first of one eye and then of the other, lasting two or three hours. There were no symptoms of conjunctival catarrh. BERGER.

FISHER (374) records three cases of children in which swelling of the eyelids was associated with the occasional presence of albumen in the urine. All these patients, though not actually ill, were weakly and delicate. He then gives two cases in which there was swelling of the eyelids associated with lethargy, but repeated examinations failed to detect albumen in the urine.

In another case where there was swelling of the eyelids albumen was always present, but the child seemed no worse than those in which it was not found.

The author looks upon the presence of albumen associated with swelling of the lids as evidence of some vasomotor instability or

defect of metabolism rather than to any organic lesion of the kidneys. MARSHALL.

It is rather remarkable that in the twenty-three cases of cerebro-spinal meningitis which were examined by CHANCE (375), in no instance was there choroiditis of the suppurative form. The principal intra-ocular trouble was an œdema of the disk, and signs of obstruction to the retinal circulation and dilatation of the lymph sheaths of the vessels. Vision was reduced in some of the cases where such examination was possible. There was also paralysis of the external rectus in two cases and a complete ptosis on the left side in one case. There was also some conjunctivitis. No autopsies were obtained. BURNETT.

STILLSON (376) believes that many of the annoying but indefinite eye symptoms are referable to nasal troubles chiefly seated in the middle turbinal, and that the removal of this body is followed by relief. BURNETT.

MORTON (377) reports a case—one of a number he has seen—of conjunctivitis of both eyes, mucous or muco-purulent, in a man suffering from gonorrhœa in the last stages and when an infection from the outside seemed improbable. These eye infections, as well as the arthritis often observed in gonorrhœal subjects, are due to toxins or the gonococcus in the blood. BURNETT.

BOOK NOTICES.

IV.—**Gesammelte Abhandlungen von Katharine Kastalsky, Dr. Med.** (Collected writings, published after the death of the author.) 1900. Moscow: A. A. Lewenson. Octavo, pp. xviii., 151, with six plates, one in colors, and a portrait of the author.

Dr. Kastalsky was born in Moscow in 1864, and received her degree of doctor of medicine at Berne in 1895, and died in Moscow in 1899. She wrote a number of papers on pathological topics, chiefly ophthalmological; and so highly was she esteemed by her colleagues that, as a memorial to her, her scattered writings were collected and published in this volume, both in Russian and in German versions, together with her portrait and an appreciative obituary notice by Professor Ewetzky.

The ophthalmological papers, eight in number, treat of injuries, tumors, trachoma, panophthalmitis, and actinomycosis, and are of considerable scientific value; while the book is further of interest as being the expression on the part of her colleagues of a fine feeling of regard for a fellow worker. W. A. H.

V.—**Der normale Sehnerveneintritt des menschlichen Auges.** (The normal optic-nerve entrance in the human eye.) Clinical and anatomical investigations. By Dr. ANTON ELSCHNIG, Privat-docent of Ophthalmology in Vienna. Micro-photographs by Prof. O. ZOTH, Graz. With 20 text-figures and 16 micro-photogravures on 8 plates. 1900. Carl Gerold's Sohn, Vienna. Large octavo, pp. 83.

The author believed that the normal topographical anatomy of the optic-nerve entrance had not kept pace with the pathological anatomy of this part. He therefore examined anatomically forty-two eyes whose refraction and configuration of the disc had been noted in life, and his monograph is a detailed and exhaustive account, based on these examinations and the earlier literature, of the normal nerve entrance and its varieties. He distinguishes

five types of optic-nerve entrance, and describes various forms of physiological excavation and conus, the general descriptions being elucidated with diagrams and some of the special descriptions with micro-photographs. The value of the book lies chiefly in the fact that it furnishes an anatomical explanation of every physiological variation of the optic disc that is seen with the ophthalmoscope.

W. A. H.

VI.—**Lunettes et Pince-nez.** A medical and practical study by Dr. GEORGE J. BULL, Paris. With an introduction by Dr. E. JAVAL.

Second edition. Small octavo, pp. 106. Paris, 1899. Masson et Cie.

This book is a sufficiently elementary treatise on the various sorts of spectacle lenses and their mountings, the systems of numbering them, rules for wearing them, and the like.

Javal adds to his former introduction an interesting postscript which we may translate in full: "Ten years have elapsed since this book appeared. The present edition, long desired, shows the progress which has been made in that period, and which, for the most part, has come to us from America. I would call attention particularly to the use of the spherometer and to the great perfection attained in the fitting of nose glasses.

"From America also we learn of an evolution in medical optics, which, having become one of the spheres of action of the oculist, now tends to return to the hands of the optician. It is evident, indeed, that in order to prescribe glasses one need not have had a general medical education. Thus, whatever valid objection may be urged against it, the evolution that I speak of is destined rapidly to gain ground. In America, to my knowledge, there exist already ten schools in which opticians' apprentices learn the practice of ophthalmometry, of optometry, and of skiascopy. This example surely will be followed in Europe, and if, some years hence, Dr. Bull issues a third edition of this book, circumstances will oblige him to adapt it for the use of opticians.

"Will that be progress?"

W. A. H.

VII.—**Atlas seltener ophthalmoskopischer Befunde.** Zugleich Ergänzungstafeln zu dem Atlas der Ophthalmoskopie. By Professor J. OELLER, Erlangen. Part I. Five plates, with text. Price $1.50. J. F. Bergmann, Wiesbaden.

Professor Oeller has decided to supplement and to continue his well-known and meritorious Atlas of Ophthalmoscopy, with

an Atlas of Rarer Ophthalmoscopic Conditions, of which the first part has just appeared. The conditions represented are: 1. Retinitis circinata with vascular changes. 2. Retinal striations and membranes in the vitreous. 3. Albuminuric chorio-retinitis. 4. Congenital posterior staphyloma. 5. Optico-hyaloid disc and conus. The illustrations are executed with the same care, naturalness, and artistic excellence which have characterized the author's previous work. Each plate is accompanied by a text, in which description and discussion are entered into with considerable detail. The text is translated into English by Thos. Snowball, M.B. (Aberdeen), whereby it is made accessible to a larger circle of readers. A. K.

VIII.—**The American Year-Book of Medicine and Surgery.** By various authors under the charge of G. M. GOULD, M.D. Volume I. Surgery, pp. 610. Cloth, $3.00 *net*. W. B. Saunders & Co.: Philadelphia and London. 1901.

This really excellent résumé of the year's progress in the various branches of surgery maintains its high standard. The chapter on Ophthalmology is written by Hansell and Reber, of Philadelphia. The important articles of the year are briefly reviewed and frequently accompanied by critical comments. The purposes of a digest are thus not only fulfilled, but an excellent idea is given of the general trend of the year's work in a given specialty. Notwithstanding the great interest which the special chapters have for the workers in a particular department, the chief value of the book lies in the ability given to the special worker to rapidly overlook the advances made in other branches, and in particular in General Surgery. The necessarily vast subject-matter treated under the latter heading is admirably compiled, and its study cannot be too strongly recommended. A. K.

MISCELLANEOUS NOTE.

The sixth annual meeting of the Western Ophthalmologic and Oto-Laryngologic Association will be held in Cincinnati, April 11 and 12, and attendance of the sessions is invited. The chairman of the local committee of arrangements is Dr. C. R. Holmes, of Cincinnati.

Fig. 1.

Fig. 2.

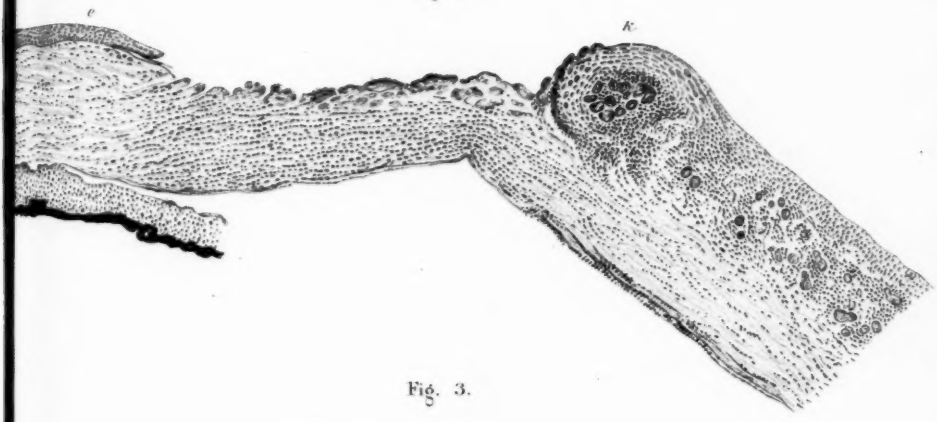
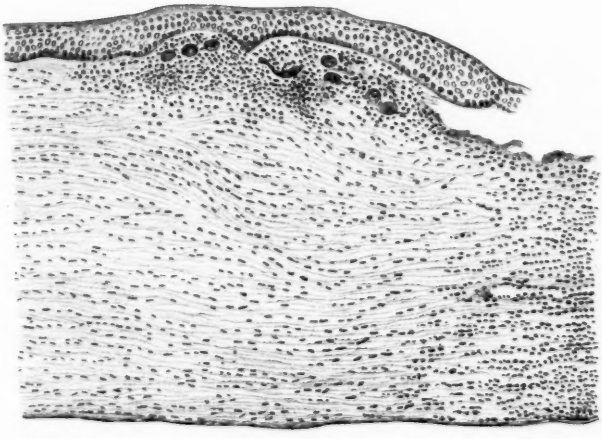


Fig. 3.



Lith. u. Druck: Lith. Inst.-Druckerei v. H. Stürtz, Würzburg. Verlag von J. F. Bergmann, Wiesbaden.

Fig. I.

Meridionale Sclerotomie.

Fig. II.

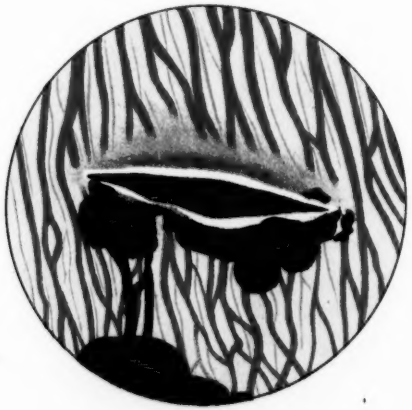


Fig. III.

Aequatoriale Sclerotomie.

Fig. IV.